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THE ZOOLOGIST:

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POPULAR MONTHLY MAGAZINE

OF

NATURAL HISTORY

AND

JOURNAL FOR RECORDING FACTS & ANECDOTES

RELATING TO

QUADRUPEDS, BIRDS, REPTILES, FISHES, ANNELIDES,
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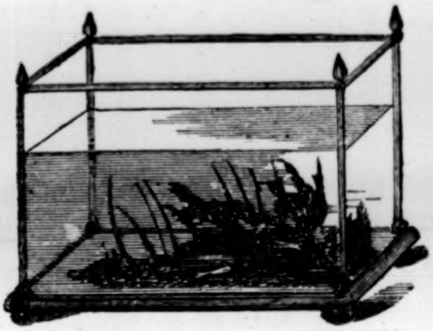

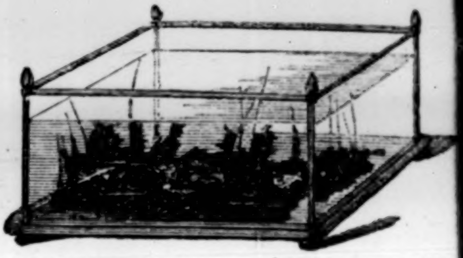

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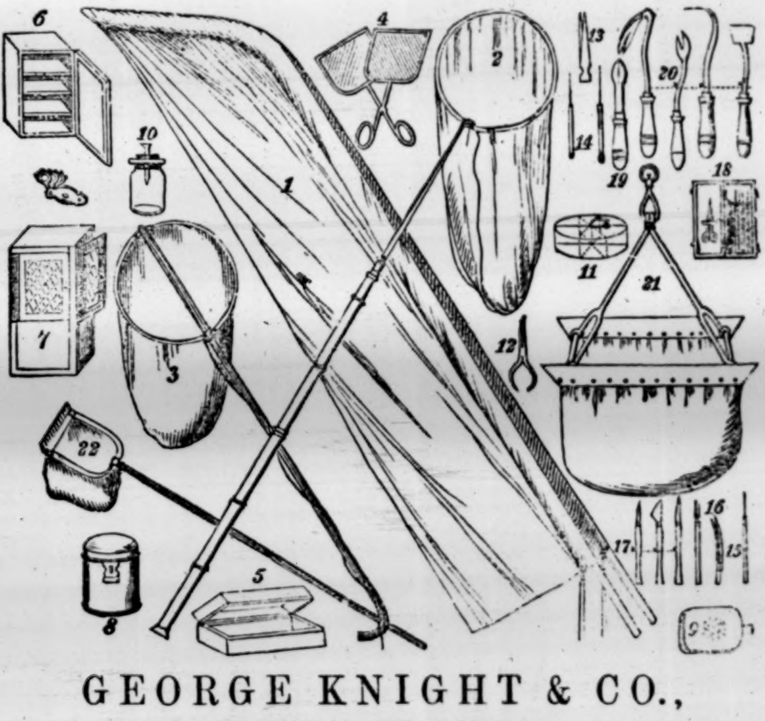

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Observations on the Zoology of Borneo.

By A. R. Wallace, Esq.

A residence of fifteen months in Sarawak and its neighbourhood having given me a very good idea of the Natural History of N.W. Borneo, I will briefly note the results, for the information of my friends and the readers of the 'Zoologist.'

With a very few exceptions, the Mammalia and birds are not very interesting or numerous. Of the former I obtained about thirty-five species, among which are two species of orang-utan, five other Quadrumana, the rare and curiout otter, Potamophilus barbatus, the no less interesting Gymnurus Rafflesii, and several curious Rodentia and Insectivora. To the great orang-utans I devoted particular attention, and have probably seen more of these animals in a state of Nature than any other European: I resided for eight months in the district they frequent, and in that time succeeded in shooting fifteen specimens, male and female, old and young, and among them two males of the smaller species, hitherto only known by the female skeleton. As an account of my observations on the orangs has been sent to the 'Annals of Natural History,' I shall say no more about them here.

The birds I found remarkably scarce and uninteresting, almost all being common Malacca species. Out of about a hundred I do not think more than ten are peculiar to Borneo, and probably not more than one or two are new. In the northern and eastern parts of the island there are probably many novelties to be found, but the districts nearest to Sumatra and to the peninsula of Malacca possess an ornithological fauna so little peculiar as to furnish strong presumptive evidence of a closer connexion between these countries having existed at no very distant geological epoch. What is known of the whole island, indeed, favours the same view, for out of 107 species of Bornean birds in the Leyden Museum only twenty-five are peculiar to it, the rest being also found in Java, Sumatra or Malacca, and the greater portion common to all those countries. Birds of brilliant plumage are remarkably rare, and the Psittacidæ, so beautiful and numerous further eastward, are here represented only by the four common Malacca species. It is clear, therefore, that, from what is known of it, Borneo does not offer a very tempting field for the researches of the ornithologist.

BRITISH MUSEUM

In Entomology I was much more successful, and became, for that very reason, much more interested in this branch of Natural History. I collected very assiduously, and having, at the commencement of the dry season, been fortunate enough to discover a good locality, I perseveringly worked at it for eight months, and the result has been a collection which for the number of species, I should imagine, has rarely been surpassed by a single collector, in one season and at one station.

I find, on referring to my notes, that I have collected in Borneo about 5000 species of insects and upwards of 25,000 specimens. The species may be approximately divided thus:—

Coleoptera	2000
Lepidoptera (principally moths) . .	1500
Other orders	1500

The Coleoptera were collected as *thoroughly* as possible, no groups being neglected in favour of others, and the minute as well as the larger species being in every case secured. I am in hopes, therefore, that this collection may give a *true* idea of the Entomology of this country, which can never be done when the small and obscure insects are either little sought after or entirely neglected. This, however, has been generally the case in collections from tropical countries. Numbers of large and brilliant insects have been obtained, perhaps over a large extent of country, and during several successive seasons; and the results, exhibited in our museums, have been too often held to give a correct idea of the Entomology of the Tropics, and have led to hasty generalizations and very erroneous views as to the universal characteristics of the productions of hot and cold climates. But let us suppose that, instead of Western Europe, some tropical country, such as Borneo or the peninsula of India, had been long inhabited by a race of entomologists, while the whole temperate zone was comparatively unexplored: would not the magnificent Carabidæ of Europe, the Cetoniadæ of the Cape and of N. China, and the large and handsome insects of various families culled from all the countries of the temperate zone, have been held to prove that excessive heat was not so prolific of fine forms and brilliant colours as a lower temperature and a more varied climate? When, too, the forms of tropical insects were familiar, those of colder countries would be looked upon with more interest and admiration, and the true Carabi would certainly be pointed to as a group unequalled by anything the Tropics could produce. My Bornean collection shows that brilliant colours are by no means the necessary accompaniments of a tropical sun, for I doubt if, in that respect, these insects will surpass those even of Britain. In more than 500 species of Curculionidæ I have *not one* that is bright coloured! and the number of small and obscure insects in all the families is very great. As to size, also, I almost doubt whether the *average* of all the species would exceed that of the beetles of our own country, absurd though the idea may seem to persons who have constantly associated great size with their notions of tropical Entomology.

I have made these remarks because some persons who have seen that portion of my collections which has already arrived in England have been much disappointed, and have complained (almost as if I *made* the insects as well as *collected* them) that Mr. Fortune's beetles from the North of China, though from a comparatively cold climate, were much finer. Now, as it is generally allowed that it is easier to overlook small insects than large ones, it is hardly to be supposed that I have perversely neglected the latter for the former, and we must therefore conclude that there is a real want of size and brilliancy in the average of the Bornean Coleoptera; but I think we can show that this is also the case with insects from other tropical countries, compared with those from the sub-tropical or south temperate zone. The extensive collections of Mr. Bates on the Amazon show the same small average size of the Coleoptera compared with those of the Brazilian mountains, the Andes and Mexico. In India, too, it is well known that the finest insects and birds come from the Himalaya, *which are all in the temperate zone*, while the productions of the peninsula of India, though much nearer the equator, are not near so brilliant or remarkable. Again, the insects of Hong Kong in the Tropics are not so fine as those of Shanghae in the temperate region. We may, I think, therefore conclude that tropical heat is not necessary to the great brilliance or great size of insects, but that those of the countries bordering the Tropics are often equal, and sometimes superior, to those of countries situated nearer the equator.

The most striking features of my collection are the numbers of Curculionidæ and of Longicorns, far beyond the usual proportion of those families. The number of minute Elateridæ and Buprestidæ is also very considerable, and will much increase the lists of those groups. The numbers of the principal families are as follows, out of a total of about 2000 species:—

Longicorns	290 species.
Rhyncophora	550 „

Carabidæ and Cicindelidæ	70 species.
Buprestidæ	100 „
Elateridæ	125 „
Cleridæ	41 „
Cetoniadæ	22 „

Thus it will be seen that the Rhyncophora are more than a fourth, and the Longicorns a seventh, of all the Coleoptera, while the Geodephaga are only a fourteenth, and the Cetoniadæ a nineteenth.

On the whole the Coleoptera may be said to contain a few very large and a few very handsome species, a large number of moderate size and of very varied and elegant forms, while the great mass of them are small and obscure. These remarks will also apply, in a great measure, to the Hymenoptera, Hemiptera and Diptera. The Orthoptera, however, are more truly tropical in appearance, containing many large, singular and beautiful insects.

The diurnal Lepidoptera are comparatively few and uninteresting, most of the species being also found in Java and Malacca: there are, however, a few striking exceptions among the larger species; Papilio Payeni, *Bois.*, P. Neptunus, *Guer.*, a new species allied to P. Codrus, and the magnificent Ornithoptera Brookiana, are the most remarkable; and there is also a sufficient sprinkling of the small Lycænidæ and Erycinidæ to show that many other fine things may be expected when the interior shall be better known.

In the nocturnal species I have been more successful, though I only found one spot where they could be obtained: this was a cottage at an elevation of 1000 feet on a mountain ridge, surrounded by jungle and fruit trees. Here, on dark wet nights, they came to a lamp in the verandah, so plentifully as sometimes to keep me incessantly employed for several hours: I have taken as many as 200 specimens and 120 species in one night! but such occasions were rare, and I would often pass a week or ten days without obtaining a dozen specimens. On dry and fine nights there were none, neither on wet nights, if it was moonlight; but I do not remember one occasion on which it was both dark and wet that I did not obtain a very plentiful harvest. Some of the Noctuas and Geometræ are very beautiful, and many present singular forms of antennæ, palpi and legs, not observed in European species.

I will now say a few words as to my future plans. The two years which I have now spent in the East I consider as, in a great measure, preliminary or preparatory to the main object of my journey, which is to investigate the less known islands of the Eastern part of the Archipelago—Celebes, the larger Molucca Islands, Timor, and, if possible, New Guinea. I feel myself now far better qualified than if I had gone at once to those countries. I have acquired the Malayan language, and have become acquainted with the manners, customs and prejudices of the people. I have learned much by experience in Eastern collecting, and have obtained such a knowledge of the productions of the western portion of the Archipelago as will add greatly to my pleasure and interest while exploring the Eastern.

I look forward, in fact, with unmixed satisfaction to my visit to the rich and almost unexplored Spice Islands,—the land of the Lories, the cockatoos and the birds of paradise, the country of tortoise-shell and pearls, of beautiful shells and rare insects. I look forward with expectation and awe to visiting lands exposed to destruction from the sleeping volcano and its kindred earthquake; and not less do I anticipate the pleasures of observing the varied races of mankind, and of becoming familiar with the manners, customs and modes of thought of people so far removed from the European races and European civilization.

The physical privations which must be endured during such journeys are of little importance, except as injuring health and incapacitating from active exertion. Intellectual wants are much more trying: the absence of intimate friends, the craving for intellectual and congenial society, make themselves severely felt, and would be unbearable were it not for the constant employment and ever-varying interest of a collector's life, and the pleasures of looking forward to a time when the stores now amassed will furnish inexhaustible food for study and reflection, and call back to memory the strange beautiful scenes among which they have been obtained.

A. R. WALLACE.

Singapore, March 10, 1856.

A List of the Birds of Banffshire, accompanied with Anecdotes.

By THOMAS EDWARD, Collector of and Dealer in Natural-History Specimens at Banff.

BEFORE I begin to enumerate the species, a few words concerning the district, the varied and interesting Ornithology of which I am about to record, may not be without interest, especially to those to whom it is entirely unknown. Banffshire is situate on the South side of the Moray Firth, between the counties of Aberdeen and Moray; from the former of which it is separated, with a few trifling exceptions, by the river Deneran, and from the latter by the river Spey. On the shore it is about forty miles in extent, and it reaches sixty or seventy miles inland, gradually narrowing as it recedes from the coast. Although several spots are yet in a half-wild state, still, as a whole, the county is generally under cultivation, and that of the highest order; and yields, together with the two counties already mentioned, the very finest grain,—a fact well known to the corn-dealers of London, to which place large quantities are exported, and fetch the very highest price. A few morasses are left, but these are fast disappearing. Draining and other improvements are continually in progress, and our hills in many places are beginning to assume the appearance of verdant fields; places where the moss, the heather and the bracken were lately the only plants, and where the wail of the plover, the birr of the muir-cock, and the scream of the merlin were the only sounds, are now enlivened by the mellow voice of the lark as she wings her heavenward way, or rises before you as you tread the well-cultivated soil. Of lakes or lochs we have very few; so that my list, as regards the larger waterfowl, is very scanty; for, although great numbers of them are annually seen on their migrations, few descend to seek rest or food within the district, and scarcely any remain with us.

We have some woods and a few smaller plantations, both luxriant and verdant; but of hedgerows we are almost entirely destitute. We have most beautiful valleys, intersected with rich meadows and pasture-lands, well stocked with cattle of the choicest breeds. The two rivers already mentioned, together with a few smaller streams, such as the Burn of the Boyne, the Burn of Portsay, and the Burn of Cullen, constitute the whole of our fresh-water courses. Of hills we boast a few: these are distributed over the county, and Ben-Vennis is the highest.

Our sea-coast, with very little exception, is rocky, and in some places is bold, high and rather precipitous; for instance, at Troup-head, Gamrie-head or Moir, and Loggie-head. Other parts, however, although rocky, are comparatively low and flat, and in many places are approached by sloping and grassy braes. The greater portion of our low-lying rocks and beaches are laid under water twice in the day; so that the shore-birds which frequent such situations have to retire at each tide. We have no mud-flats or salt-marshes, and our sands are very limited in extent.

With these few, and, I may add, very simple, remarks, I will now begin my list.

The Golden Eagle (*Aquila chrysaëtos*). Many are the stories told amongst us of large birds of prey, said to be eagles, having been procured, and of others having been seen; but, from the want of proper information on the subject, and persons properly qualified to distinguish the species, it is impossible to say with certainty what these may have been. It is also currently reported that an eagle, but of which species I have never as yet been able to make out, has been known to breed in our higher districts. This is, however, very doubtful; at least, I have several times visited the places where it was said to breed, particularly the rocky heights of Ben-Vennis, the most likely locality within the county, and have never as yet found it to do so; nor do I think the place at all suitable for the eyrie of the eagle. Be this, however, as it may, several specimens of the golden eagle have been both trapped and shot within the district. One, a splendid bird, was killed near Tomintaul, about forty years ago; and another in Glen Fiddoch, about ten years later. One was seen, three years since, hovering above the sea-braes betwixt Banff and Portsay; and, having pounced upon and secured what appeared to be a rabbit or a small-sized hare, was again observed to rise, with his screaming prey firmly held by his powerful talons; and, winging his aerial way seawards, was soon for out of harm's way, escaping unscathed, although several gunners were in hot pursuit.

The Erne or Sea Eagle (*Aquila albicilla*) has also been at least twice procured.

The Osprey, Fish Hawk or Fishing Eagle (*Aquila haliaëtus*). This species has likewise been obtained as well as seen. A very fine male specimen was shot, about twenty-one years since, amongst the high cliffs of Gamrie-head. Another was seen by a surgeon of this town, some years afterwards, amongst the rocks at a place called Melrose, a few miles from where the other was obtained.

The Peregrine Falcon, Blue or Hunting Hawk (*Falco peregrinus*). Although there are some doubts as regards the former or any of their congeners having bred with us, there are none with respect to the present species. The peregrine is one of our native hawks, breeding annually, although very sparingly and generally in inaccessible places, in some of our highest headlands. It is somewhat strange, but not more strange than true, that our peregrines, when they can be procured alive, always find, like our grain already spoken of, a speedy market southward, and always bring a good price, whether young or old, being esteemed the best for falconry, and far superior to any procured elsewhere. Two which I saw taken from the nest at Troup-head, in 1852, sold the day after for a guinea each, and had they been kept three days longer would have brought double that sum, if not more. Their eggs also, when they can be obtained fresh, bring a high price to the daring individual who either descends or ascends for them, and again arrives in safety; this, however, is not always the case. I remember being an eye-witness once to one of the finest scenes with one of these birds and its quarry which it is possible to imagine. I had often seen some hawks mincing their prey, but never before in a wild state, and especially in such a place. One day, having got myself immured in a very dangerous and disagreeable fix on the precipitous and rugged brow of Gamrie-head, and having in my descent reached a landing, I lay down to rest, being somewhat fatigued and not a little torn by the jutting crags and sharp rocks. Whilst lying thus, a peregrine came sailing slowly but steadily along, bearing something large in its talons. On he came, seemingly unconscious of my presence, and alighted on a ledge only a few yards from where I lay. I now saw that the object he carried was a partridge. Having fairly settled down with his quarry on the rock, I could not help wondering at and admiring the collected ease and cool composure with which he beheld his struggling captive (for it was still alive) until death put an end to its sufferings: no lacerating with his beak at the body of the poor and unfortunate prisoner, in order, as it were, to hasten its termination; no expanding of the wing to maintain his equilibrium; although the last and dying struggle of the bird caused him to quiver a little. All being now over, and with one foot resting upon his game and the other on the rock, silent and motionless as a statue, the noble captor stood, with an enquiring eye, gazing at the now lifeless form of his reeking prey, seeming to doubt the fact, if birds can do so, that it was already dead; but there was no mistake: the blood, oozing from its mouth and wounds, its body being doubtless pierced by the talons of the conqueror, had already begun to trickle down the sides of the dark cliffs, dying the rocks in its course. Satisfied at last that life was fairly extinct, an incision was then made in the neck or shoulder of his victim, and into this the falcon thrust his bill several times, and each time that it was withdrawn it appeared covered with blood. This being done, and having wrenched off the head, which he dropped, he then began not to pluck but to skin his food, from the neck downwards; and, having bared the breast, commenced a hearty meal by separating the flesh in portions from the sternum, with as much apparent ease as if he had been operating with the sharpest surgical instrument. I should have liked well to have seen the end of the work thus begun; but, unfortunately, a slight movement on my part was detected by the quick eye of the hawk: my proximity was discovered. Having gazed at me for a few, and only a few, seconds, with an angry and piercing scowl, mingled with surprise, he then rose, uttering a scream so wild and so loud as to awake the echoes of the surrounding rocks; whilst he himself, with the remains of his feast, which he bore along with him, rounded a point of the cliff and disappeared; and there is no doubt he ended his repast in unmolested security.

The Merlin (*Falco æsalon*). These daring little fellows we have as natives. I have known them breeding on several of our hills, such as the Knock, the Bin (Huntly), Auchindoon, and Ben-Vennis. I have called the merlin a daring little fellow; and is he not? Yes, to be sure he is, and every naturalist knows it, or at least should know it. I know it, for several instances of his courage and daring have come under my own personal observation. Of one instance in particular I was an eye-witness, in which a merlin kept at bay and maintained his ground against a whole host of rooks and jackdaws. But, alas! poor merlin, I doubt he suffered at last. Strolling about our seabraes one morning, I was a good deal surprised at hearing a most tremendous noise a little before me, as if all the crows in the world had been there, and were all sounding their French horns at once. On coming to the spot I was no less astonished at seeing a little merlin battling with and holding at defiance an enormous flock of the black-robed gentry, whose screaming had first attracted my attention. Fain would I have stepped in, or rather up, for they were above me, and lent my aid to the weaker party, by giving the darkies a volley, for I had my gun with me; but curiosity forbade. One would think that such a host could and would have smothered the little creature in a twinkling, had they wished. But such was not the case: they did not all assail him at once, nor yet singly, but generally three, four, and as many as seven, would be on him at a time, the main body keeping at a short distance, encouraging their companions, as it were, with their cawings. After a while one of these storming parties would retire, and then another would sally forth to the charge. The merlin, however, being of lighter metal and swifter of wing, managed, with wonderful dexterity, generally to avoid their attacks; now rising, now descending, and now turning in a zigzag direction, first to one side, then to the other; and mostly, also, succeeding, whilst doing so, in giving one or other of his adversaries a pretty severe peck, which had the effect of sending him away screaming. It appeared to me that the crows wished to drive the hawk from the braes, and that he was not willing to go; but I may be mistaken. At last, however, a crow, which seemed more courageous than the rest, rushed at him with such fury that I actually thought he would have swallowed him up at once, or sent him headlong down into the sea. But, no! the merlin withstood the shock, and contrived to deal his assailant a thrust as he approached and passed him. The merlin now rose considerably higher, and was followed only by this single opponent, who returned, with redoubled fury, to the combat. Up, up they soar, fighting as they go. Ah! they close, they scream, they grapple, and the feathers fly like dust. Down, down they come, locked in deadly embrace. I run to catch them both. But, no! See! they part, mount again and again, scream, close, and, as before, fall, but not this time to the earth; for, see! they part and mount again. But, 'tis now their last time; for, lo! the hawk, rising several yards above his bold and venturous antagonist, rushes down upon him with a yell, such as hawks alone, when irritated, know how to utter, and with such force that both fell topsy-turvy right down into the sea, above which they were fighting. I looked to see them rise again; but they did not. After a little splashing all was over with the crow, but not with the hawk: he was still alive, although in a very precarious situation, from which he made several unsuccessful attempts to rise, but could not. It would seem that in dealing the death-blow to his tormenter he somehow or other got himself entangled at the same time, by perhaps his talons entering some of the bones of the crow, from which he could not disengage himself. But, be this as it may, there is little doubt but that both met with a watery grave; for on my leaving they were both fast drifting seaward, a small breeze blowing off the land at the time, with the crows hovering over them and still cawing.

Thomas Edward.

April, 1856.

The Nightingale near Oundle.—I beg to state that the nightingale was heard distinctly on the 25th of April last, in a coppice on the borders of Rockingham Forest, not more than three miles from Oundle. I do not remember ever to have heard the nightingale so early in this cold county.—*W. M. H. Church; Geddington Vicarage, Kettering, May* 8, 1856.

An Egg Prodigy.—I have lately been presented with a double egg of the common goose, so marvellous in its character and dimensions that I cannot resist the desire to chronicle its wonders. The egg was laid by a goose belonging to Mr. Baylis, of Pixley, near Ledbury, in Herefordshire. It weighed 1¼ lb. good weight, and it measures 5 inches and 3½ lines in length by 3 inches and 5 lines in breadth; and it contained within it another perfect egg, which measures 3 inches and 7½ lines in length by 2 inches and 7 lines in breadth. The outer egg had been blown before it was sent to me, but a sufficient portion of the contents was adherent to the shell to show that it had contained a yolk. The inner egg, which I extracted through an orifice made by fracture of one end of the outer egg in travelling, was in every respect a perfect egg, and the broken pieces of the outer egg have been so skilfully replaced by fair fingers that the outline of the egg is very little impaired. The goose that laid this monster egg had her first brood last season, when her eggs were all of the usual size. She opened this season by laying the egg above described, and then stopped for about five weeks, when she laid six ordinary-sized eggs, on which she was sitting on the 5th inst., when I last heard from my friend the Rev. James Mapleton, of Torrington, near Ledbury, to whose kindness I am indebted for this great curiosity. Your readers will not be surprised to learn that Mr. Baylis states that the goose appeared very "mopish" for two or three days before laying the egg. To assist in forming a correct conception of the strangely abnormal size of this egg, I add that the size of the mute swan's egg, as given by Mr. Yarrell, is 4 inches in length by 2 inches and 9 lines in breadth. My eggs of the same bird, and also of the hooper, are larger, *i.e.* about 4 inches and 6 lines by 3 inches. My fine egg of the great auk measures 4 inches and 4 lines by 3 inches. The average size of the emu's egg, judging from specimens in my own collection, does not exceed that of this monster goose egg; and I have ascertained by experiment that it took eleven average sized eggs of the common hen to make up its weight. I have several double-yolked eggs of the common goose, the largest of which measures 4 inches and 7 lines by 2 inches and 8 lines; but this is the first instance that has fallen within my knowledge of one perfect egg being contained within another.—*J. P. Wilmot; Leamington, May* 8, 1856.

Note on the Late Appearance of the Common Scoter and the Scaup Duck in Norfolk.—I have once or twice recorded in the 'Zoologist' the occurrence of the common scoter (*Oidemia nigra*) unusually late in this district, in one instance even as late as July: a fine adult male of this species was killed on the 2nd of May on the Norwich river, about a mile and a half from the city, and therefore at a considerable distance from the sea-coast; a female was observed with it, but not obtained. A pair of scaup ducks were shot at Hickling Broad on the 21st of April.—*H. Stevenson; Norwich, May* 7, 1856.

The Miller's Thumb in Confinement.—Early in the present year Mr. Hall brought me a miller's thumb or river bullhead (*Cottus Gobio*), the first I ever had the opportunity of watching. These little fishes are so abundant in the streams of Herefordshire that I have often found a dozen in my net at once when fishing for water-beetles, but in our London waters they seldom turn up: this is on account of the preference which the miller's thumb has for clear running streams with a stony bottom. Like the beardie, the miller's thumb is a fish that always lies at the bottom; it has no power of sustained swimming, and never suspends itself in the water like a true swimming fish, but it will occasionally make a forced march to the surface, working its enormous pectorals with great vigour and great labour, and sometimes such efforts extend even to a tour of the globe or vessel in which it is kept, but after such extraordinary exertions it sinks down, apparently exhausted, to the bottom, and there for hours remains motionless. There is something very remarkable in the changes of colour which this fish undergoes; and these changes do not appear referrible to the ordinary tendency which the colour of certain fishes has to assimilate with the colour of the surface on which they are lying, but extraneous causes produce the effect: the swallowing a worm, the effort of a swimming adventure, and, on one occasion, the extrusion of ova, have produced such changes that the fish could not have been recognised under its altered aspect: the colours are various shades of gray and brown, and these are sometimes homogeneous, sometimes varied with great distinctness and brilliancy. Soon after this fish came into my possession I observed its abdomen begin to swell, as though gorged with food, of which it partook very freely, eating worms and raw meat with great avidity. This swelling continued to increase until it seemed most oppressive to the fish, which appeared continually gasping for breath. On the morning of Good Friday these symptoms were explained: it had extruded during the night a mass of ova, collectively equal in size to a sparrow's egg, and each individual ovum was about the size the egg of Helix hortensis, and, like that, nearly transparent and enclosed in a tough envelope: the mass was closely adherent, somewhat reminding one of frog's spawn, but the ova appeared to have no mucilaginous covering. The number of ova must have been about a hundred: of course I proposed counting and measuring them, in order that I might favour the readers of the 'Zoologist' with exact statistics on these heads, but two mornings after their extrusion I found the unnatural parent had torn the mass asunder, and devoured the greater part of the ova, and before night the work of demolition was completed by the combined efforts of the miller's thumb and two minnows.—*Edward Newman.*

What is Gasterosteus pungitius, and have we that Fish in Britain?—The problem thus proposed for solution has to be considered from several points of view: 1st, from the point of priority, of course I would adopt the Linnean version of the subject, provided *a*, that I clearly comprehended his meaning, and *b*, that I was as clearly convinced that his was not a collective species, but I doubt on both these points, and reserve them for further consideration. I will refer, in the first place, to Cuvier, and quote every word of his description:—"L'Epinochette (*G. pungitius*, Lin.) est notre plus petit poisson d'eau douce. Elle a sur le dos neuf épines toutes fort courtes; les côtés de sa queue ont des écailles carénées" (*Règne Animal*, ii. 170). In the 'Fishes of Scandinavia' (pl. iv. fig. 2), is figured, under name of G. pungitius, a Gasterosteus having nine spines on the back, and coloured red about the lower jaw, cheeks, gill-cover and base of the pectoral. I have to regret that my ignorance of the Swedish language prevents my understanding a single word of the description, but the plates in this work are the most scrupulously accurate of any natural-history representations I have ever seen, and therefore I take the evidence as perfectly conclusive that the G. pungitius, or "Sma Spigg" of Sweden, is a fish the male of which assumes a red breast in the breeding season. There is no doubt that the G. pungitius of Linneus, Cuvier and of the 'Fishes of Scandinavia' is one and the same fish. Well, then, we arrive at this conclusion, that there is on the continent of Europe a fresh-water Gasterosteus which has constantly nine dorsal spines, which has keeled scales on the sides of its tail, and the male of which, in its nuptial livery, is red about the gills and breast, like the familiar G. aculeatus. Now for the contrast: we have in the ditches round London myriads of a very minute fresh-water fish, known to every boy who *goes a stitling* by the name of "tinker:" this fish has nine spines on the back, a perfectly smooth tail, and the male, in nuptial livery, is of the most intense velvety black, never by any chance exhibiting the slightest tinge of red. Turning again to Cuvier, I find appended to the description of G. pungitius the following note:—"Il y a encore dans nos eaux une espèce très voisine (*G. lævis*, Cuv.) qui manque de cette armure," and in the subsequently published 'Histoire Naturelle des Poissons,' by Cuvier and Valenciennes (t. iv. p. 506), this smooth-tailed species stands as G. pungitius, the G. pungitius of the 'Règne Animal' being omitted altogether. We now come to the historian of 'British Fishes,' an author who has done more for British Natural History than any other living or dead. Mr. Yarrell has given two figures of a Gasterosteus pungitius: these are respectively in the first and second editions of his admirable 'History;' but it is very difficult to distinguish by a wood-cut those critical differences on which closely allied or questionable species may be said to depend. Neither of the cuts gives an exact idea of our familiar little "tinker," but that in the first edition comes the nearest. The description in both editions is the same, and is comprised in a very few words. Mr. Yarrell says it "is distinguished from all the other sticklebacks by the nine or ten spines on the back, all anterior to the dorsal fin, and by the sides being perfectly smooth without any lateral plates," and the colour is described as "a yellowish or olive-green on the back; sides and belly silvery white, with minute specks of black; fins pale yellowish white." See 'British Fishes,' i. 99, where reference is made to Pennant, Donovan, Fleming and Jenyns, all of whom, I do not doubt, agree in describing the "tinker" as Gasterosteus pungitius, a decision in which I am not disposed to coincide. I will now describe my fish, which I will call

The TINKER or 9-spined Stickleback (*Gasterosteus lævis*).

Character.—Number of fin rays, 1st D. 9, 2nd D. 10 : P. 11 : V. 1 : A. 1 + 9 : C. 12, each of the rays of the 1st dorsal has a small triangular fin membrane at its posterior base, all of them are erectile at the pleasure of the fish, and when erected it is seen that they are not seated exactly on the median line of the back, but on two lines, each removed almost imperceptibly to the right and left of a median line; on one line there are five spines, on the other four, and they are seated alternately one on each, right, left, right, left, &c.; every spine on the right line has, moreover, a most decided inclination to the right, and every spine on the left line to the left, so that the series are well represented by the teeth of a saw recently set, when they are alternately and purposely bent to the right and left; the 2nd dorsal and the anal are of nearly equal length, the former originating slightly in advance of the latter: the body is slightly crescentic in outline, the posterior extremity being somewhat depressed; its surface is smooth, and the carinated scales on the sides of the tail, which Cuvier makes a character of G. pungitius, are entirely wanting. The colour is very uniform as compared with that of our ordinary sticklebacks: it is a somewhat metallic yellow-green on the back, gradually becoming paler and almost white on the belly, the whole being irrorated with minute black dots: the fins are very pale, almost colourless. The male resembles the female until the month of March, when he begins to assume his nuptial livery; the median line of the breast and belly then becomes black, a colour which day by day extends on either side, until all the lower parts of the fish becomes of the most intense velvety black; this eventually extends almost over the whole body, the back only retaining slight indications of the normal colouring.

Habits.—A fearless and ferocious little fish, instantly reconciled to captivity, and attacking with fury any prior inhabitant of the vessel in which it is placed: it will frequently seize a fellow-prisoner by the gill, the tail or a fin, and retain its grip with the firmness of a bull-dog: in the same way it will instantly seize a worm when presented to it, and allow itself to be drawn out of the water without relinquishing its hold: the females become very much distended with ova, and deposit them simultaneously; they are very large, generally eight or ten in number, and are immediately devoured, if found by fishes of the same or other species: its nest is not known to me. Unlike other species of Gasterosteus, it will not exist when confined in salt water, however diluted.

Habitats.—It is the most abundant of all fishes in the marsh ditches on the Surrey side of London; but it is rarely met with in ponds: in the ditches by the side of the Surrey Canal it breeds by myriads, and is a source of endless amusement to the boys of the neighbourhood, a stick, a thread and a worm being the only requisites for its capture.

In conclusion, I need scarcely say how much I shall feel obliged for additional information on this subject. The sticklebacks are generally considered too common to be worthy of notice, and I believe, for this very reason, we have more to learn respecting the distinction of species and the details of their interesting economy than of any other genus of fishes.—*Edward Newman.*

Some Observations on the Disease in Fish called Fungus, which is so fatal in Aquaria, Fish Ponds, &c. By Dr. Frazer.*

The plant which is the subject of the present communication is by no means of extreme rarity, nor is it of local or limited occurrence. It has been observed with considerable accuracy, and always with interest, by many scientific naturalists, and we possess several good descriptions and drawings of it, both in the form of detached essays and in systematic treatises: thus, amongst others, Ledermuller, Worsberg, Spallanzani, Lyngbye, Kutzing, Carus, N. V. Esenbeck, Agardh, Berkeley, Braun, and especially Unger, have each contributed to our knowledge of its natural history, and recorded its most striking peculiarities; and as a proof of its extensive geographical distribution, I need merely state that it has been recognised in Denmark, Prussia, Austria, various parts of Germany, France, and the British Isles. The following are the chief synonyms by which it has been known:—Saprolegnia ferox, *Kutzing, Phyc. Gen.;* Conferva ferox, *Gruithuisen*, 1821; Byssus aquaticus, *O. F. Müller, Flor. Dan.;* Vaucheria aquatica, *Lyngbye, Hydr. Dan.:* Hydronema, *Carus, Act. Leopold.* 1823; Saprolegnia Molluscorum and Achlya prolifera, *N. V. Esenbeck;* Leptomitus clavatus, prolifer and ferox, *Agardh, Syst. Alg.;* Leptomitus Piscicola, *Berkeley.* It is not uncommonly found growing upon the bodies of flies and other dead animal substances which have fallen into water, especially in the summer months, and it is also well known to occur upon the bodies of living fish, and to produce a most destructive form of epizootic disease amongst them—a perfect plague, of extremely contagious nature. Thus, for example, M. Davaine has described its baleful progress amongst the carp contained in a large pond in France. Hannover and Stilling also notice its appearing both amongst living and dead animals, growing "avec une extreme rapidité," and producing in the former illness followed by death. Unger likewise, in 1842, found sick Cyprini, with the plant fully developed upon them, in a pond in the Gratz Botanic Gardens; and, during the same year, he asserts that the fish in the environs of the town were similarly affected, in so much that mouldy fish, as they were commonly termed, were often to be met with exposed for sale in the public markets; in one large pond all the fish were exterminated by its ravages, and in the reservoirs the thymale and trout also occasionally suffered. He says, "It killed in about forty-eight hours; few recovered which were once attacked: it grew both on the body and the fins; the fish lost their natural activity, sought the surface of the water, and seemed fatigued; the plant extended from the mouth to the vent, like a covering of velvet; the scales at the points attacked loosened and fell off; the parts affected were evidently enlarged, reddened, spotted with blood spots, and occasionally ulcerated; the fish appeared to move with pain, lay on their sides or back, and these symptoms usually preceded death for only ten hours."

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* Read at the Dublin Natural History Society, on the 11th of April, 1856.

To complete its history, I may mention that it has been met with on the dead larvæ of the land salamander in water (*Carus*), or dead mollusca (*Gruithuisen*); on the wounded toes of the Triton punctatus (*Hannover*); upon a wounded eel (*Eg. St. Pierre*); upon the eggs of Limax agrestis (*Laurent*), and of Lymnæa stagnalis (*Valentin*); upon both the ova and wounded body of Cyprinus Nasus (*Valentin*); upon the eggs of the stickleback (*M. Coste*); and it is even stated that the current of water through their nests is probably intended to prevent similar occurrences. Valentin has also noticed it on the eggs of the Bufo obstetricus; Pennant described it as it occurred upon roach kept in glass vessels, and it is well known to attack various species of carp, especially our well-known favourite, the Cyprinus auratus, or gold-fish. Of its occurrence on this animal we have a description by Dr. Bennett, in the Edin. Philos. Transactions. Finally Kutzing has described three species (which I believe to be all identical), one of which is termed the Saprolegnia xylophila, and found growing upon twigs in water. I too have likewise, in my researches, obtained it growing upon twigs, identical in its nature with his drawings and with the plant as it grows upon the bodies of living and dead gold-fish, and derived originally from them.

Further research on this subject has obtained for me the information that the Saprolegnia capitulifera has been observed by Alex. Braun to develope freely on decaying pieces of Nuphar pumilus, and also rapidly to attach itself to flies falling into the water in the localities where it thus grows on the plant. This plant, which fully deserves its name of Saprolegnia ferox, as it fell under my notice, occurred amongst a number of young gold-fish, about twenty-five in number, kept in a parlour, contained in a round glass jar along with four young minnows. The gold-fish had been obtained from the Botanic Gardens of the Royal Dublin Society at Glasnevin, in September, 1855, having been bred there in the Victoria-lily house during the previous summer months: they were of small size, varying in length from one to two inches; and, as I had obtained them for the purpose of making a series of observations upon the changes which they undergo in colour during their growth, I had them in every stage — gold, silver-coloured and white, and also dull brown. On the 28th January, 1856, I first noticed that two of these fish had each an extremely beautiful white tuft, resembling somewhat the appearance of common mould, upon its side: the extent of this patch of vegetation was not more than the size of a spangle. The fish were swimming about briskly, and appeared in perfect health, and I am certain there could not have been any extent of this plant—at least sufficient to be visible to the eye—present upon them twenty-four hours previously. I instantly isolated the two attacked for observation, washed out the jar, and replaced the other fish in it: they were still, to all appearance, healthy to the most minute scrutiny. In the course of twelve hours more the plant had rapidly extended in the two fish, occupying fully twice as much of the surface as it did in the morning, and next morning (twenty-four hours) it had spread over more than half the body, reaching from the nose to the ventral aperture: one was completely dead at 10 A.M., and the other died early next day (30th January). As the plant extended over their bodies they appeared to be stiff, and swam as if moving with difficulty, seeking the top of the water; they afterwards seemed unable to do even this, sank to the bottom, and lay there sluggishly on their sides or in their usual positions: previous to this one of them appeared for a time to become top-heavy, his head sinking down so far as to threaten to turn him completely round on his back, and he made great and evidently painful efforts to regain his usual level condition. After death the plant still continued to grow over their bodies, developing on the snout and over the mouth, and on the fins and tail.

After a few days the plant manifested itself amongst others of the fish in rapid succession, upwards of half of them dying within twenty days from its first appearance amongst them. Those that last died presented visibly merely the appearance of white films extending over their bodies and dangling from their fins and tail, and did not develope during life the full-grown plant, with its tubuli, although in some it became sufficiently evident after death, and reached its perfect state and formed its zoospores. On most of those attacked at this time I noticed red bruise-like marks behind the gills, and especially upon the lower jaw, and in some also on the upper; similar appearances occurred around the ventral aperture, and in two or three upon the sides; but those first attacked did not present such appearances, nor did those which died more recently. When attacked my attention was usually attracted to them by their rising to the top of the water and swimming in a peculiarly uneasy manner, as if stiff or pained as they attempted to move; afterwards they became more and more languid, and sank to the bottom, breathing at longer intervals than in health, and irregularly, and dying usually as if suffocated, with their gill-covers widely distended and the gills visible.

I may here state that I examined these fish most carefully after death, their gills especially; the most external of the branchiæ were in parts loaded with masses of germinating spores of the plant, which evidently had the effect of destroying their structure and disintegrating them, stripping off the fine lobed capillary processes from the denser cartilaginous structure, and finally loosening the cartilages and recrossing them. The developed plant consisted of very fine fibres, forming dense interlacing masses, which somewhat resembled the fine nap on velvet. The fibres were of rather tough consistence. Those

I first obtained were straight and unbranched; afterwards I found a branched condition equally common. The tubuli contained an amorphous mucilaginous fluid, with masses of globules, aggregated in very unequal amount in various parts; the larger were evidently oil spots, and almost filled the diameter of the smaller tubes; others were more minute, and multitudes were so small as merely to present the appearance of the finest dots—these distinctly exhibited "Brown's movements"—and in some instances I had fine views of the more perfect circulation, termed "cyclosis." The tubuli rarely had partitions; they ended when sterile in blunt tops, gradually tapering upwards, and in oval capsules when fertile. I could trace all the stages of the formation of these capsules. First the granular matter developing more densely at the upper part of the tube than elsewhere, so as to give it a distinct brownish colour, the top then becoming dilated into an ovoid form, and the granular matter still thickening and becoming separated from the ordinary contents of the tube, and the septa rapidly forming by the inflexion of the utricle. Afterwards, as exactly described by Unger, the fructification progressed towards its development, the granular matter continuing to become more dense and opaque, and in its structure numbers of comparatively clearer spaces formed, which increasing, at last showed the capsule filled with from twenty to fifty zoospores arranged like the meshes of a network, and having still some granular matter evident at the sides of the capsules. I then distinctly noticed a movement of the four anterior zoospores* previous to their escape from the mother cell, one of them applying itself to the flask-like orifice, and gradually forcing its way out; evidently, as sketched, undergoing considerable pressure in the process, which probably, in this instance, occupied half an hour. Its escape was soon followed by that of the other zoospores, generally emerging two by two, one succeeding the other with great rapidity, and darting out for some distance (at least half the length of the capsule) into the water; they then, after a short rest, floated off right and left with evident motive power, and the other cells in the capsule in their turn began to exhibit independent movements and to escape; finally, the whole got out leaving the capsule empty, the process taking altogether half an hour, or a little longer, for its completion.

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* This I wish to state distinctly, as I find that Alexander Braun, whose accuracy of observation is so well known, states that in "Derbesia Saprolegnia and Chytridium, the motion" which commonly occurs in other families, "does not become evident until after the birth of the previously crowded germ-cells:" I have also been able to verify this movement more than once.

Almost all the zoospores that I observed resumed their globular form soon after escaping, and ceased to display motile force in the course of six to ten minutes, after which they became stationary.

To illustrate the rapidity of the formation of these capsules, I may mention that a tuft of barren tubuli removed late at night and placed for observation in a glass cell, had developed in great luxuriance its fructification by next morning (within twelve hours), and from this I obtained the varieties of globular mother cells, and those with double and triple cells, and also those remarkable monstrous forms in which the barren tube grows again above the apex of the capsule. Some of the barren tubes grow to a very great size and thickness, and developed spores within their substance: this, however, was extremely rare. I also saw such a tube emit four spores from its extremity, but they displayed little motile power, and floated off only a short distance after their escape. I cannot decide as to these spores having cilia. Thurot describes their having two; Alexander Braun found only one single short cilium. I did not succeed in getting them; probably I might with higher forms or with the aid of chemical reagents, which latter process I avoided, as I wished chiefly to observe the development of the plant. It is perhaps too often assumed that cilia are indispensable for producing motion in cells. I obtained very perfect views of the mode of propagation of the spores. Many of them multiplied by a process of gemmation exactly like the cells of yeast; and the freshly-formed cell might by observation be seen with its fine granular contents aggregating together and forming larger masses, and even transparent glistening globules of oil. So rapid was this budding process that the same parent cell had occasionally two, three and four buds arriving at various parts of its surface and in different states of development. As they acquired a bulk nearly equal to that of the parent cell, I could generally observe the formation of a division occurring between the two; and this rapid evolution of cells soon formed dense masses of vegetation, which, by a little care, could be seen growing under the microscope.

I would wish to direct attention to a very interesting mode of development which I have procured sketches of—the formation of thin hair-like shoots proceeding from a parent cell, and at its extremity the reproduction of the cell-form again resumed, in its usual condition prepared for active fissile development. I would merely state, in connection with this, that the growth of some forms of mould appears to be closely analogous to what I have described. Thus I have seen similar thread-like processes connecting the sporules of the Ascophora

Mucedo, and it appears to me to be both an indication of extreme vital energy in the reproductive process, and also an arrangement, the object of which is evident, to enable the spores in their development to spread more rapidly over a more extended surface, and to interfere less with each other in their mutual growth. Having thus obtained a second condition of this plant, in which it is a rapidly budding unicellular body, I watched with much care for its return to the tubular form, and was able to trace it pretty perfectly. As the masses of cells developed they became rather larger in bulk and less defined (their utricle or limiting membrane, if at all existing, being of extreme fineness), and from the surface of the growth one of the cells developed the new shoot, which resembled in all things the parent plant.

It remains now to describe what I believe is new, at least as far as my researches go, the fact that this unicellular rapidly-developing condition of the plant is perfectly capable of destroying life in fish; many, indeed almost all of them which have recently died with me, and I have now lost all my fish but three, have presented this state of plant alone (at least during life). It adheres in dense masses to the fins, the tail, and even to the edges of the scales over the body; it collects on the gills, disorganises them, breaks down the higher organised tissues, lays bare the cartilaginous structures in the gills, tail and fins, and interfering with respiration (as it seems to me), proves even thus more rapidly fatal than from its more slow but equally certain destructive action on the vital tissues. It is impossible not to recognise in this, which might be termed a "mycelium stage," a strong analogy with the mycelic stage of Fungi. We know how dry rot, for instance, produces its destructive ravages in wood in its rapidly growing mycelial condition, not in its more advanced state of development, and I have, in my researches on this subject, become strongly impressed with the conviction that it is to this as yet unrecognised state of the Saprolegnia we are in reality to ascribe much, if not all, of the destructive action which it exerts on animal life. In fact, I believe we have in it a clear instance of a plant causing disease in healthy bodies, and not, as is too commonly believed, a mere vegetative growth developed on a body already in a state of ill health. Such is, indeed, the general doctrine held with reference to epiphytic growths occurring in disease, which are frequently regarded as accidental epiphœnomena, whereas their invariable presence alone in such cases would of itself go far, to the unprejudiced mind, to prove a more intimate connection between them and the diseased condition which they accompany, or, as I think, frequently produce.

[A discussion followed the reading of this highly interesting paper, during which Mr. Williams corroborated the fact of the destructive properties of this disease, as exemplified in gold-fish formerly in his possession, which were completely smothered by it: he attempted to destroy the disease by removing the diseased spots, but ineffectually. Mr. H. Barton mentioned that some years since he found that some minnows and sticklebacks which he had in confinement died of this disease; they had been fed for some time previously on bread-crumbs, after which he had placed them in a vessel with some gold-fish: these latter remained perfectly free from the disease, though all the minnows and sticklebacks died. Dr. Kinahan had seen this disease in the following aquatic animals while in a state of freedom and alive:—the gudgeon, loach, eel (young), stickleback, fry of the salmon and trout, and common smooth newt: during one season it was so prevalent in one part of the Dodder that nearly all the salmon and trout fry were destroyed by it: he had also seen it on the larva of the dragon-fly.]

Extraordinary Run with a Salmon.—On Wednesday last the Marquis of Bowmont, while angling for salmon in Sprouston Water, had one of the longest and most fatiguing runs perhaps on record in Tweed fishing. After some hours the fish reached opposite the Scurry rock, and here the Marquis thought to finish the sport by bringing him ashore, but unfortunately the line, from rubbing on the rock, or some other cause, broke near the hook, and the fish got off. The fish was several times distinctly seen during the running, and was evidently above 30 lbs. weight. The run lasted between five and six hours.—*Edinburgh Courant.*

The Artificial Rearing of Salmon.—There is every reason to expect a most successful hatching at the Stormontfield ponds this season. The ova present throughout the soundest and healthiest appearance—indeed, the hatching has already commenced. On the 3rd ultimo several of the little fish in the boxes were observed to have escaped from their tiny cells. This is the third season of the experiment. It may be interesting to give the dates of hatching in each of the three. In the first season the ova were deposited on November 23, 1853; and hatching was first observed on March 31, 1854. In the second season the ova were deposited on November 14, 1854; and hatching was first observed on April 18, 1855. In the third season the ova were deposited on November 22, 1855; and hatching was first observed on April 3, 1856. The large pond is still occupied by a large proportion of the first season's hatching, so that while one portion of the first season's hatching have rapidly matured, another portion of the very same hatching are at this moment in the pond, little parrs, with free egress afforded them, but not taken advantage of.—*Perth Courier.*

Artificial Breeding of Salmon.—It seems evident that the controversy regarding the habits of the salmon is being cleared up. I have read with great pleasure and profit the letters of your correspondents at Perth, who, from their proximity to the breeding-ponds at Stormontfield, where the greatest experiment in pisciculture ever undertaken is being carried on, from their laudable desire to give every information, and from their rigid adherence to facts observed by themselves, have done more towards clearing up this much-vexed question than could have been hoped for. It would appear from the letters in the last 'Field' that the experiment is by no means completed. Let us hope that the noblemen and gentlemen, proprietors of the Tay fishings, who have already done so much, will not relax in their exertions till the experiment is fully carried out. There is much to be discovered yet; and it is to be regretted that no distinctive mark can be put upon the young fish now about to depart from the breeding-pond. Even at present there appears some confusion; for by the letter signed "Peter of the Pools" it would appear that several of the young fish were taken by force from the pond, and the same mark placed upon them as upon those which left it voluntarily. This, I am afraid, may lead to error; because, should any of these fish so taken and marked be retaken in the smolt state from the river during the present season, it may leave a loop-hole for prejudice to carp at. I think the experiment at Stormontfield does much to reconcile the theories of the two parties, one of whom asserts that the parr remain two years in the river, and the other that they go away when only twelve months old. Mr. Young, of Invershin, turned all his young fish into the river when they were twelve months old; some of these were retaken in the form of grilse the same season; but how can he be certain they all went to the sea? Some of them certainly did, because they came back grilse; but it is quite impossible he can prove they all went. Here his experiment agrees with that at Stormontfield; for, had all the young fish been expelled from the pond, it might have been concluded they all went to the sea, because some of them would have returned. Shaw, on the other hand, might possibly have detained fry which would have gone and returned had they been permitted. I can see nothing that cannot be reconciled between the two theories. The sporting world, the angler, the naturalist are greatly indebted to you for the irresistible evidence you have brought forward, and the impartial manner in which you have opened your columns to all comers who choose to write like gentlemen.—*Extracted from the Field newspaper.*

The Horse-leech (Hæmopsis sanguisuga) *Swallowing a Worm.*—I trust there are a few of the junior readers of the 'Zoologist' to whom the fact I am about to relate is as new as it was to myself: I had been one morning to the canal in order to obtain materials for the "Tittlebat theory" propounded at page 5124 of this present 'Zoologist,'—a theory which one of these days may possibly vie with that of my illustrious predecessor in these abstruse researches, the immortal Samuel Pickwick,—and having returned home laden with water-weed and worms, tinkers and tadpoles, leeches and larvæ, I popped one of the leeches into a tank, and one of my progeny, constant companions of all my piscations, popped one of the worms into the same tank. The leech almost immediately fastened on one end of the worm, which by its writhing, poor thing, seemed strongly to object to the seizure: this writhing soon attracted the attention of a juvenile perch, who forthwith sallied out from the ombrageous shelter of a murex and seized that end of the worm which was still at liberty. I like to be precise, and gladly would I inform my readers which of the assailants possessed itself of the worm's head and which of its tail; but the clew to this discovery is lost for ever. After a short tussle the greater strength of the perch became very manifest; he swam deliberately and majestically round and round the tank with the leech in tow, the poor worm stretched out to double his natural length and a fourth of his natural substance serving as tow-line. Being very desirous of knowing what was the object of the leech, I made the perch relinquish his hold, and the leech and worm at once descended to the bottom, there rolling over and over, and the worm again writhing in apparent pain. In a few minutes it became evident that the worm was decreasing in length and the leech increasing in thickness; the worm was in fact in course of transfer to the stomach of the leech; in ten minutes the worm was swallowed all but one end, which became very pointed and was in constant motion, seemingly feeling about for something to take hold of; and, but for the difference in colour, really looking like an integral part of the leech, reminding me very forcibly of the finger at the extremity of an elephant's trunk. This last portion at length disappeared, and the whereabouts of the worm was only indicated by the heaving and undulating skin of the overgorged leech. Now this worm-swallowing propensity on the part of the leech was known to Cuvier, who speaks of its feeding on "lombrics," but Linneus gives it the faculty of blood-sucking, and was, I believe, the author of the stereotyped, but very apocryphal assertion, that nine of these leeches will kill a horse: I incline to the opinion of Huzard, who, in the 'Journal de Pharmacie,' asserts that it never attacks a vertebrate animal.—*Edward Newman.*

Entomological Botany (with more especial reference to the Plants frequented by the Tineina). By H. T. Stainton, Esq.

(Continued from page 5012).

Rubus Idæus (continued).

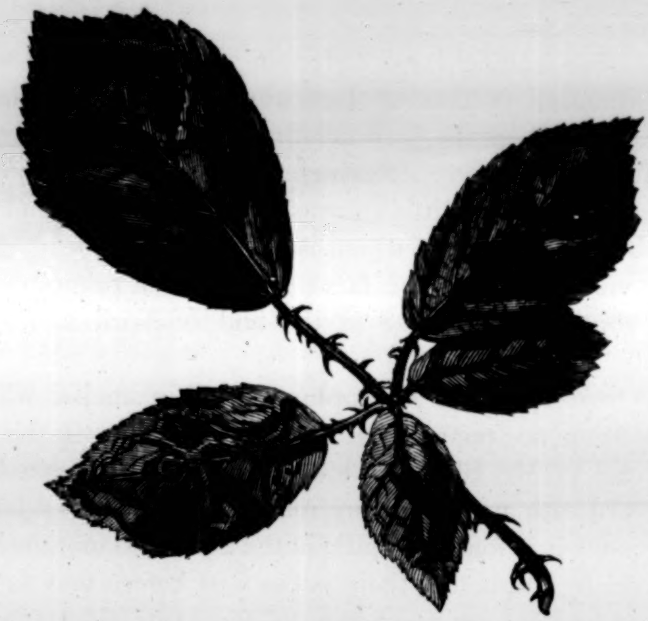
Mr. Hardy has met with the curious larva of Chrysocorys festaliella on this plant, but I mention it more in detail under the "Common Bramble," on which I have found it myself. The only other larva I have to mention is a Nepticula discovered by Professor Frey, at Zurich, and which he has named splendidissima; it somewhat resembles aurella, but has a *black head* and *perpendicular* fascia.

It is hardly likely another twelvemonth will elapse without our finding it here.

Common Bramble.

I prefer giving this without a Latin name, as I am by no means certain whether any single species would answer my present purpose, and the Latin name of the "Common Bramble" is Legion.

Speyer cites as feeding on fruticosus the following; *Argynnis Daphne,* Thecla Rubi, Saturnia Carpini, Lasiocampa Rubi, Callimorpha dominula, Acronycta auricoma and *Euphrasiæ,* Thyatira Batis and derasa, Hyppa rectilinea, Euplexia lucipara, Polia herbida, Orthosia gracilis, Xanthia silago, Cerastes Vaccinii, Erastria fuscula, Chlorissa viridata and Sericoris urticana, to which must of course be added Notocelia Udmanniana: those species of which the names are in Italics have not yet been found here. I have long suspected that some species of Œcophora larva must feed in the stems of the bramble, and though up to the present time I have never succeeded in finding any, Dr. Jordan once slew, as he says, "a larva under queer circumstances. You know the holes made by Cemonus lethifer and allied species of bee in bramble-sticks; I was cutting off one to bring home, and as the burrows of the bee are usually at some depth in the stem, I thought I would shorten it; in so doing, I cut across the stick right through the middle of a green (Depressaria?) larva, which had either made the burrow, for there were no bees in it, or else had gone there for winter quarters; in either case it seemed to me somewhat curious." I mention this circumstance, which took place in March, 1854, in hopes that some of my readers may imitate Dr. Jordan in finding a larva in bramble-sticks, without following his example of slicing it in two. The larva of Chrysocorys festaliella, so long sought for without success, was found in some plenty by Mr. Wilkinson, of Scarborough, last autumn, and after I had cultivated the personal acquaintance of those he sent me, I was able to find it readily when down at Bideford, the peculiar blotched appearance of the leaves easily attracting one's attention. The larvæ appear to feed indifferently on the upper or under side of the leaf, but only eat the leaf half through, so as to cause pale greenish blotches, which form a striking contrast with the natural dark green of the bramble-leaves; and a leaf on which many larvæ are feeding has a singularly variegated appearance. Large blotches, a little puckered, are made in the leaves by the larvæ of Tischeria marginea; the commencement of these mines is generally whiter than the broader portion, and when the mine is small the shape reminds one vastly of a ram's horn. They may be observed throughout the winter and early spring months, and again in July. The long slender tortuous galleries, with which all who observe hedges in winter must be familiar, on the leaves of the bramble, are the empty mines of Nepticula aurella; when tenanted, they are far less conspicuous, and the appearance they present is shown in the annexed wood-cut.



Rosa canina. Dog-Rose.

There is no doubt that the insects here mentioned will be found on other species of Rosa than canina, but we adopt that as our text as it is emphatically our common wild rose, the rose which we remember from our childhood, and the rose which has oft lacerated our fingers.

Speyer enumerates as feeding on it Saturnia carpini, Liparis dispar, Orgyia gonostigma and antiqua, Gastropacha quercifolia, Pœcilocampa Populi, Clisiocampa neustria, *Acronycta cuspis* (the larva of which excessively resembles that of A. Psi, only that it has a long tuft of hair on the hump on the fifth segment), Orthosia litura, Ennomos lunaria, illunaria and illustraria, Odontopera bidentata, Anticlea derivata and badiata, Harpalyce fulvata, Scopula prunalis, Tortrix (lævigana) rosana, Pardia tripunctana, Spilonota roborana and Pterophorus rhododactylus.

This last-named, though wanting in so many collections in this country, is considered in many parts of the Continent as an injurious garden-insect, from the *penchant* that the larva has for eating up the undeveloped rose-buds. The little yellow Dictyopteryx Bergmanniana is too common a frequenter of rose-bushes to have escaped the notice of any diligent collector.

The first rose-feeding larva belonging to the Tineina which engages our attention is that of Lampronia quadripunctella: in the month of June, when the gay-coloured Harpella Geoffrella is on the wing, his sombre insect, to which Professor Zeller gave the sour epithet of *morosa*, flies in little swarms, at early morn, round the twigs of the rose-bushes; the larva, which is reddish brown or brownish red, at any rate more red than the larva of Spilonota roborana, feeds in the young shoots of the rose at the end of April and beginning of May.

The next rose-feeder is Coleophora gryphipennella, which, now that it has been so popularised by Mr. Douglas in his 'World of Insects,' and by Mr. Shield in his 'Practical Hints,' has become a household word with nearly all my readers, and needs no lengthened history from me; it is found juvenile in the autumnal months blotching the rose-leaves by extracting their juices just before they fall, and in May we again find it after a six months' fast at its old trade, with its ochreous case with serrated edge attached to the under side of the leaf.

Tischeria angusticollella, a species we have yet to find in this country, treats the rose-leaves in a very similar mode to that followed out on bramble-leaves by T. marginea; it makes large blotches, a little puckered. A Lithocolletis feeding on rose is one of the "things hoped for," of the existence of which we are not at present aware. The known Nepticulæ of the rose are three, — anomalella, angulifasciella and *Centifoliella;* to what extent the last feeds on other species of rose than that (Rosa Centifolia) from which it derives its name we are not aware. The mines of anomalella and angulifasciella are sufficiently distinguished, as the gallery-mine with a yellow larva and the blotch-mine with a greenish larva. The mine of the yellow larva of Centifoliella resembles somewhat that of anomalella, but the commencement of the mine is not entirely filled up with excrement, for you see a slender whitish margin on either side.

A larva which I have repeatedly collected, but never bred, feeds on the pulp of the hips in October; it is pinkish in colour; it quits the hips when full-fed (you can see at once where it has been by the black streaks on the side of the hip), and probably goes into the ground, or perhaps into the stem of the rose-bush. Mr. Douglas had suspected that this larva might belong to Stigmonota Germarana, and M. Bruand observes of that species, "chenille dans les baies de rosier."

Further, I wish to call the attention of my readers to a larva found by Mr. Scott, in the Bedeguar-gall of the rose, not the proper, apod, inert tenant of the gall, but a lively sixteen-legged brown Lepidopterous larva; I suspect referable to some Tortrix, for we know that a very pretty species, *gallicolana*, has been bred in Germany from oak-apples, and why not another species on the Bedeguar rose-galls?

It is not a little singular that, extensive as the genus Gelechia is, we do not know of a single species which feeds upon the rose.

H. T. Stainton.

Mountsfield, Lewisham,
May 5th, 1856.

List of the British Eupitheciæ, with Notes on some of the Species.

By Henry Doubleday, Esq.

My kind friend, M. Guenée, having carefully examined every British species of Eupithecia which I could obtain to send to him I forward a list of them, which will help to clear up the doubts which have existed as to the nomenclature of several species, and will add a few remarks about some of them.

List of British Eupitheciæ.

1. Togata, *Hüb.* 464, ♀. *Gn.*
2. Pulchellata, *Steph.* *Gn.*
3. Linariata, *W. V.* *Hüb.* *Gn.*
4. Rectangulata, *Linn.* *W. V.* *H.-Schæff.* 275, 276. *Gn.*
   Cydoniata, *Bork.*
   Var. Subærata, *Hüb.* 463. *Steph.*
   Var. nigrosericeata, *Haw.*
   Var.? Sericeata, *Haw.*
5. Coronata, *Hüb.* 372, 373. *Gn.*
   V-ata, *Haw.*
6. Debiliata, *Hüb.* 466. *Gn.*
   Nigropunctata, *Chant.*
7. Tenuiata, *Hüb.* 394. *H.-Schæff.* 168, 169. *Gn.*
8. Plumbeolata, *Haw.* 360. *Gn.*
   Begrandaria, *Boisd.* *H.-Schæff.* 128, 129.

9? Haworthiata.
   Plumbeolata, var. *a*? *Haw.* *Gn.*

10. Pusillata, *Hüb.* 378. (non *Haw.*) *Gn.*

Subumbrata, *Hüb.* 233. *Boisd.*
11. Pygmæata, *Hüb. Dup. Gn.*
Palustraria, *Doubl. App. Zool.* 1850.
12. Satyrata, *Hüb.* 439. *H.-Schæff.* 149, 151. *Gn.*
Cinereata, *Curtis.*
Var. Callunaria, *Stainton.*
Var. Fagicolaria, *MSS.*
13. Abbreviata, *Steph. Wood,* 660. *Gn.*
Reductaria, *Boisd.*
Nebulata, *Haw.?*
14. Exiguata, *Hüb.* 379. *Wood,* 659. *Gn.*
Trimaculata, *Haw.*
Var. Ochreata, *Steph.*
Var. Lanceolaria, *Doubl. List.* (non *Boisd.*)
15. Innotata, *Knoch. Hüb.* 441, 442. *Gn.*
16. Indigata, *Hüb.* 339. *Gn.*
17. Nanata, *Hüb.* 387. *H.-Schæff.* 160, 161. *Gn.*
Angustata, *Haw.*
18. Subumbrata, *W. V. Gn.*
Piperata, *Steph. Wood,* 678.
Obrutaria, *H.-Schæff.* 145, 146.
19. Dodoneata, *Gn.*
Subumbrata, *Haw.? Steph.?*
20. Castigata, *Hüb.* 456. *Gn.*
Singulariata, *Haw. Steph. Wood.* 661.
21. Constrictata, *Gn.*
Distinctaria, *H.-Schæff.* 162, 163?
22. Vulgata, *Haw. Steph. Wood,* 666, *Gn.*
Austeraria, *H.-Schæff.* (non alior.)
Var. Subfuscata, *Haw.*
Var.? Subfasciata, *Steph.*
23. Sobrinata, *Hüb.* 465. *Gn.*
Lævigata, *Haw. Steph. Wood,* 658.
Var.? Expressaria, *H.-Schæff.* 284, 285.
24. Absynthiata, *Linn. Hüb.* 453. *Gn.* (var. A.)
Elongata, *Haw. Wood,* 671.
Var. Notata, *Steph. Wood,* 670.
25? Minutata, *W. V.? Hüb.* 454 (non 237).
Absynthiata, *Gn.*
Var. Innotata, *Steph.*
26? Assimilata.
Absynthiata, *Haw. Steph. Wood,* 669.
Absynthiata, var. B. *Gn.*
27. Expallidata, *Gn.*
28. Succenturiata, *Linn. Hüb.* 459. *Gn.*
Var. Disparata, *Hüb.* 246.
29? Subfulvata, *Haw. Steph. Wood,* 675.
Succenturiata, var., *H.-Schæff. Gn.*
30? Oxydata, *Tr. Boisd. Gn.*
Cognata, *Steph.*
31. Irriguata, *Hüb.* 397. *Gn.*
Variegata, *Haw. Steph. Wood,* 681.
32. Consignata, *Bork. Hüb. Wood,* 682. *Gn.*
33. Venosata, *Fab. Hüb. Wood,* 683. *Gn.*
Decussata, *Don.*
34. Subnotata, *Hüb.* 458. *Gn.*
Simpliciata, *Haw. Steph. Wood,* 672.
35. Denotata, *Hüb.* 453. *Gn.*
Pimpinellata, *Herrich-Schæff.* 153. *Doubl. List.*
36. Pimpinellata, *Hüb.* 443, 444? *Dup. Gn.*
Albipunctata, *Haw.? Steph.? Wood?*
37. Pumilata, *Hüb.* 388. *H.-Schæff.* 127. *Gn.*
Bistrigata, *Haw.*
Strobilata, *Steph. Wood,* 656 (non *Hüb.*)
Var. Rufifasciata, *Haw. Steph. Wood,* 657.
38. Subciliata, *Gn.*
Circuitaria, *Stain.* (non *Hüb.*)
39. Egenata, *Gn.*
Egenaria, *H.-Schæff.*
40. Sparsata, *Hüb.* 398. *Gn.*

7. *E. tenuiata.* The larva of this species feeds in the blossoms or catkins of the common sallow (*Salix Capræa*). The best way to obtain them is to collect a quantity of these catkins just as they are beginning to fall, and place them in a breeding-cage; they will require no further attention, and in July the moths will appear.

8. *E. plumbeolata.* The insect described by Haworth under this name is unquestionably identical with Begrandaria of Boisduval, and of course this latter name must sink. M. Guenée regards the smaller insect, which I intended by the name Plumbeolata in my list—but which I now propose to call Haworthiata—as a variety, and it is no doubt the var. α of Haworth, of which he says "Forte distincta." I am inclined to think that it is distinct, and Mr. Vaughan has most kindly sent me some particulars which tend to confirm me in my opinion; he says that when living the base of the abdomen is orange, while in plumbeolata it is of one uniform gray tint throughout. I believe plumbeolata appears about the end of May; Mr. Vaughan says that the smaller species, Haworthiata, does not appear till July, and continues on the wing about three weeks: it appears to be attached to Clematis Vitalba.

10. *E. pusillata.* The only specimens that I ever obtained of this insect were taken by Samuel Wood, gardener to Captain Coker, who resides in Devonshire.

12. *E. satyrata.* I have no doubt that the callunaria of Mr. Stainton and the insect taken by the Rev. J. Greene and called fagicolaria are varieties of this species. The ground-colur of the wings varies from leaden gray to deep brown, but the markings are the same in all.

13. *E. abbreviata.* The larva of this species feeds upon the oak, and it appears in the winged state earlier in the year than any other species: I have seen it out the end of March.

14. *E. exiguata.* I have bred this species from larvæ which fed upon the whitethorn: I expect it also feeds upon the beech, as it abounds on the trunks of those trees in some parts of our forest, where there seems to be nothing else for it to feed upon, as there is no underwood.

19. *E. dodoneata.* The larva of this small species feeds upon the oak, and I think Mr. Bentley told me that he had bred it from the gale (*Myrica Gale*).

21. *E. constrictata.* H.-Schæffer's figures 162 and 163, E. distinctaria, very closely resemble this insect, but this species is considered identical with the E. Libanotidata of Schlœger, which I

have received from M. Zeller, and, although closely allied, it is certainly distinct from our British species.

22. *E. vulgata.* This is the austeraria of H.-Schæffer, but the original figure of Hübner appears to represent a variety of castigata; and M. Guenée has therefore adopted Haworth's name, about which there is no doubt.

23. *E. sobrinata.* This species varies very much. Mr. Shepherd has a splendid series from Scotland, which he kindly allowed me to send to M. Guenée, who said it was a remarkable variety, and at first he was inclined to consider it a distinct species. The insects taken by Mr. Samuel Stevens appear to be the expressaria of H.-Schæffer, but M. Guenée considers this to be only a variety of sobrinata, and I believe it would be impossible to separate them from some of Mr. Shepherd's Scotch specimens.

24, 25 and 26. M. Guenée is inclined to consider all these as local varieties of one species,—the Absynthiata of Linné. I am rather inclined to think that this opinion is not correct. No. 24 appears to be the true Absynthiata of Linné, which he says feeds upon wormwood, &c.: it is well figured by Hübner, No. 453. It has been bred from wormwood by Mr. S. Stevens, and from ragwort by Mr. Gregson and others: it is principally found upon the coast and in the fens, and appears in the perfect state in August.

25. Well-figured by Hübner, No. 454, under the name of minutata, *W. V.*; it is considerably smaller than the preceding insect, and appears in the perfect state in June: the larva feeds in the autumn upon heath (*Calluna vulgaris*).

26. This appears to be the Absynthiata of Haworth, Stephens, &c., and is a garden-insect, and seems to have been more common formerly than it is at present. The wings appear to be broader and more rounded, and the colour darker than in the other two species (?): the perfect insect appears in May. Mr. Wailes mentions, in a letter, seeing two at Newcastle, on the 4th of the present month, and Mr. Shepherd kindly sent me a living specimen to-day (May 7th); the larva is unknown. These observations may induce others to pay attention to the subject, and prove whether they really constitute three species or are only local varieties.

27. *E. expallidata.* This large species is very closely allied to Absynthiata, but is always much paler in colour, and is almost without the white marginal spots on the upper wings: it has principally occurred on the coast, and is found in August.

29. *E. subfulvata.* This species seems to be considered by nearly every continental author as a variety of E. succenturiata, but I think erroneously; the only real difference seems to be that of colour, and had the two insects occurred regularly together, I should have been inclined to have adopted this opinion; but subfulvata seems to be a much commoner species, and to occur in situations where succenturiata is not met with. I hope some one will settle the question by rearing both insects from the larva.

30. *E. oxydata.* M. Guenée thinks this will prove a distinct species, and that the larva feeds upon the osier (*Salix viminalis*).

34. *E. subnotata.* The larva of this insect feeds upon the various species of Chenopodium.

35. *E. denotata.* The larva of this species feeds upon the blossoms and seeds of Pimpinella Saxifraga: it is not common here, and principally found near the coast on dry soils: it is very rare on the Continent.

36. *E. pimpinellata.* This very distinct species appears to be rare in this country; I have taken three specimens here in August: when living, the base and apex of the abdomen are snow-white.

38. *E. subciliata.* I suppose this is the insect which is called Dosithea circuitaria in Mr. Stainton's 'Annual,' but it bears no resemblance to the figures of that species in Hübner's and H.-Schæffer's works; it seems rare in England: its ciliated antennæ distinguish it from all the other Eupitheciæ.

39. *E. egenata.* Mr. Buxton took a single specimen in Wales, and Mr. Bond met with a wasted one in the Isle of Wight; I have seen no other specimens: it is a very distinct species.

Mr. Bond has a specimen of another species evidently distinct from any of those in the foregoing list; it is closely allied to Veratrata. Mr. Bond kindly allowed me to send it to my friend, M. Guenée; he thinks it is not Veratrata, but says it will not do to create a species from a single specimen not in very good condition. In conclusion, I beg to thank those friends who have kindly lent me specimens of this interesting genus for examination, and I feel particularly obliged to Mr. Edwin Shepherd and Mr. Bond for their kind assistance, and to Mr. Stainton for the loan of Hübner's and Herrich-Schæffer's works.

The first volume of M. Guenée's work on the Geometræ, will, I believe, be published early in the autumn; the second volume, containing the Eupitheciæ, will not appear till the winter.

I shall be much obliged if any collectors will forward to me for examination any doubtful species of Eupithecia which they may meet with, giving the localities and dates of capture.

I recommend every entomologist to purchase M. Guenée's admirable works, and I must express my regret that such oeffnsive and uncalled-for strictures upon them have been published in this country, but I suppose it is too true, that

> "He who surpasses or subdues mankind,
> Must look down on the hate of those below."

HENRY DOUBLEDAY.

Epping, May 8th, 1856.

Some Remarks on the Economy of Granivorous Lepidopterous Larvæ.—On a former occasion I brought before the Society* some observations made upon the destruction of corn by different species of Coleoptera, more mischief being done by the weevil tribe than by any other; and my attention being called to the subject, I was led to think that much damage was done by other depredators as well as those at that time mentioned. I accordingly kept the subject in view, and accidentally discovered a large colony of larvæ, which I think I may with justice rank second to the weevils, as far as damage to corn is concerned. During the spring of 1855, whilst passing through a corn-loft, my attention was attracted by a quantity of wheat mixed with dust lying on a window-sill, which presented a somewhat unusual appearance, a good deal of it being eaten in a manner totally different from the way the weevils hollow it out, every grain touched having the larger or germinating end just taken off, and neatly rounded. On looking for the cause, I found a great number of small larvæ of a whitish colour busily at work consuming the wheat. A few days afterwards, on paying them a second visit, I found them either spinning their webs or preparing to do so; and from the great number of these webs placed so closely together, irregular masses of wheat and dust could be lifted in layers of from one to three inches in thickness. I placed a small quantity in a box, where it remained forgotten until the middle of June or beginning of July, when on opening it, I found that a large number of small moths had made their appearance, and about this time great numbers of similar moths swarmed about the stores and the outbuildings around them. These chrysalises were in colour reddish brown and semi-transparent, and enveloped in an exceedingly tough web or cocoon of a whitish hue. When the larvæ do not spin amongst the wheat, they form colonies of these cocoons in a very curious way, as the board which I now exhibit will show: it was found when removing some boarding in an old warehouse, and from the number of cocoons in so small a space an idea may be formed of the multitudes of these moths during the summer season. About a month since, whilst looking for some in a warehouse, I remarked, as I thought, a curious fungus growing from the beams in one end of the loft. I cut a quantity of it away with my knife, and found that the wood, which was partially decayed, was tunnelled out in every direction by similar larvæ, and even in some places the sound parts of the beams pierced like wood affected with the dry rot: the particles cut out during the process of boring were conveyed to the end of the tunnel, and, being held together by a web-like substance, projected in patches of from one-half to three-quarters of an inch in depth from the beams, and formed the excrescence which at first caught my attention. Some time previous to this, the warehouseman called me to look at a large quantity of (as he thought) sea-sand, which remained after the removal of a quantity of wheat, and which he imagined must have been mixed for the purpose of adulteration. On a superficial examination the resemblance was very striking, but on lifting it in the hand its lightness at once told that it was very different: on close examination, I found it was entirely composed of the rejectamenta of the larvæ alluded to: the quantity on the loft was very considerable, which shows how destructive the moths are. The wheat is eaten in a peculiar manner: in every instance, as before-mentioned, the germinating end is destroyed, and the exterior coat of the grain consumed in preference to the interior. In this they differ from the weevils, which hollow out the interior of the grain, leaving the exterior almost untouched. I do not mean to say that the larvæ refrain from touching any portion but the outside of the wheat, but that they appear to prefer it to the interior. It may be worth mentioning, that in most cases, where the cocoons were fastened to the walls, a number of these gnawed grains were attached to the webs; but this may, I think, be perhaps attributed to the wheat becoming entangled during the turning or shifting in the loft. In the beginning of April of the present year I placed a quantity of the wood cut from the beams, and well filled with larvæ and cocoons, in a box, and about the end of the month, on opening it, I found that a few moths had come out, apparently identical with those before noticed. Some of these proved to be the Tinea cloacella (*Haw.*), which is very commonly in this country called the clothes-moth; the others, being a good deal rubbed, could not be identified with certainty, but I think they were all alike. A peculiarity in their habits deserves to be noticed, namely, on opening the box in which they were they did not at first attempt to fly, but ran quickly about, hiding wherever they could amongst the contents, and, if well-concealed, would not stir unless again disturbed. I cannot speak with certainty as to the names of the moths which I obtained last year, as the box in which they were was unfortunately mislaid; but that several species of Tinea infest the warehouse alluded to I have little doubt. The occurrence of Tinea cloacella amongst them is, I think, of considerable interest, as I am not aware that any previous mention has been made of its destructive habits with reference to corn.—*James Haughton, Jun.*

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* Read at the ordinary Meeting of the Dublin Natural-History Society, on the 16th of May, 1856.

[I have received from a correspondent a beautiful example of silk felt spun by the larva of the above-mentioned on some cognate species, and described to me as covering the rafters and under surface of the floor in a granary at Waterford. The object of the little creatures in this apparent waste of silk is not very obvious, but the *fabric*, so to call it, has long since been known to corn-chandlers, and has received the name of *tela-del-maiz.—Edward Newman*].

Food-plant of Anthocharis Cardamines.—As soon as I saw Cardamine impatiens again set down as the food-plant of Anthocharis Cardamines by Mr. Stainton, in his 'Manual,' I mentioned to that gentleman my conviction that this was an error: he has not, however, altered the statement in the reprint of No. 1, so that he appears still to entertain what I consider a very erroneous opinion: this is only material inasmuch as the young entomologist is thus led astray, and his search for the larva and pupa of Cardamines misdirected to a plant which he would have great difficulty in finding, and which, as far as the observations of my entomological friends and myself go, has never yet fed a larva of Cardamines. The food of this insect is the seed-pod of various Cruciferæ, and I cannot find that it has much preference for those of the genus Cardamine. As this difference of opinion existed between Mr. Stainton and myself, I wrote to Mr. Doubleday, whose reply, in such a point, I presume, will be considered final: here it is. "In reply to your query about the food of the larva of Cardamines, I may say that I have found it upon several plants. I believe that Cardamine pratensis is the one on which the eggs are most frequently deposited, but the greater part of the larvæ must perish in this neighbourhood, because the fields are mowed before the larvæ are full-grown. I have very often seen the larvæ on the seed-pods of Erysimum Alliaria, and have several times found the pupæ on the dead stems of this plant in the winter; I think that it is the principal food-plant of Cardamines at Epping: it also probably feeds on E. barbarea and other similar plants. Some years ago we used to have a quantity of a large single rocket in the garden, and there was always a number of the larvæ of Cardamines feeding on the seed-pods. Cardamine impatiens is so local a plant *that it cannot be the common food of the larva of Cardamines.*" Those who are practicals in this our study of Entomology will not require the foregoing information; the facts are already sufficiently familiar to them; but there is many a beginner to whom Mr. Doubleday's information will be both new and interesting.—*Edward Newman.*

Remarks on Mr. Buxton's Note on Argynnis Lathonia and Pieris Daplidice.— I very unwillingly send a few lines in reply to Mr. Buxton's communication to the 'Zoologist' (Zool. 5108), and I am sorry to say that I cannot place such implicit confidence in dealers as he appears to do. In saying this I do not mean to condemn them all, as I believe some of them are thoroughly trustworthy, and would not deceive any one; but I well know that too many are exactly the reverse. Hundreds of specimens of the rarer British Lepidoptera are annually imported from the Continent and distributed throughout the country; numbers of pupæ of such species as D. Galii and D. Euphorbiæ have also been sent over, so that the fact of the insect being exhibited alive is no proof of its British origin. A dealer in London assured me some little time since that a number of specimens of Orgyia Vau-nigrum were taken in this country last summer! I quite agree with Mr. Buxton in his remarks about the advertisements on the cover of the 'Zoologist:' they should not be inserted unless it was distinctly stated that the specimens were continental; as worded, they are calculated to mislead, like the advertisement about a work on Taxidermy, which, instead of being anything new, is an old and almost useless pamphlet, published at Chatham a dozen years since. The high price which has been paid for British Lepidoptera lately is a great inducement for dealers to import specimens from the Continent, where A. Lathonia, P. Daplidice, and many of our rarer species, can be purchased at about threepence each. Mr. Buxton alludes to some specimens of A. Lathonia, which he had of the late Mr. Seaman, of Ipswich, unset: these specimens were no doubt part of a lot which I know he had in this state from the late John Hoy, Esq., of Higham, who took them on the Continent. Mr. Seaman would not have sold British specimens of this insect at two shillings each: when at his house he showed me rows of L. Chryseis and L. Virgaureæ, all of which, he assured me, were taken by himself in Britain: I purchased three or four specimens for examination, and upon relaxing them the wings returned to the position in which they had originally been set upon the Continent. Having mentioned these two species, I cannot help expressing my surprise that Mr. Stainton has admitted L. Chryseis into his 'Manual,' and rejected L. Virgaureæ: there is just as much ground for considering one to be British as there is for the other, or the difference, if any, is in favour of the latter species, Lewin stating that he once saw two of these butterflies settled on a bank in the fens: there is no doubt that Lewin mistook males of dispar for Virgaureæ. Haworth gives no locality for either species, and *all* the reputed British specimens of L. Chryseis were obtained from a dealer, who gave Epping as the locality, and a more unlikely spot for its occurrence he could hardly have mentioned. Surely we have good reason for being suspicious when a dealer pretends to have taken a conspicuous insect by dozens, year after year, which no entomologist has ever met with in this country. A good deal has lately been said about Parnassius Apollo: this is a strictly Alpine species, the larva feeding upon various Sedums, and, although it may possibly occur in the mountainous districts of Scotland or Ireland, there is no probability of its ever occurring in England, unless it should be accidently introduced. As another proof of the care required before admitting species to be British, I may mention that three specimens of a Phigalia were sent to me to name, with a statement that they were "unquestionably British," and with two localities were sent: the moment I saw them, I recognised them as specimens taken by a collector in the United States a few years previously, and, upon their being shown to him, he at once said that I was correct: I knew the insect perfectly well as a North American species, and, from the pins and the way in which they were set, I knew who collected them. Since the foregoing was written, I have seen the following sentence in the 'Intelligencer:'—"Mr. Buxton is eloquent on the bad habit entomologists have of *only believing the rarities in their own collections to be indigenous.*" I can find no statement of this kind in Mr. Buxton's communication, and most positively deny that I ever doubted a species being British because I did not possess it: I know that imposition is extensively practised, and I wish to put young collectors on their guard.—*Henry Doubleday; Epping, May* 16, 1856.

Pieris Daplidice and Argynnis Lathonia.—Since the publication of the last 'Zoologist,' I have received a letter from Mr. Dale, stating that Mr. Miller did not take Daplidice near Tewkesbury: the mistake arose from Mr. Miller supposing Sinapis to be Daplidice. I have also heard from Mr. Doubleday that the late Mr. Seaman had several foreign specimens of Lathonia in his possession, taken by Mr. Hoy: this, of course, throws great doubt on any specimens obtained from Mr. Seaman, and I therefore reject them. I have, however, received a letter this morning from Mr. Garrett, in which he says that the number taken by him near Ipswich was *seven* in all, and stating in what collections they are now placed. Of these there can be no possible doubt.—*E. C. Buxton; New Brighton, May* 16, 1856.

[I have great hesitation in saying anything more on this subject, but I wish briefly to refer to one statement in Mr. Buxton's note: it is as follows:—"Mr. Newman (Zool. 5071) declares that the occurrence of Lathonia and Daplidice is limited in each species to about six cases" (Zool. 5108). I have referred to page 5071, and find nothing on the subject. Will Mr. Buxton oblige me by correcting the reference? If I find I have really made such a statement I will at once retract it.—*Edward Newman.*]

Occurrence of Vanessa Antiopa at Cobham, Surrey.—I have just added to our collection a fine specimen of this rare species: it was taken by a gardener resident in this neighbourhood (from whom I obtained it), in the month of September of last year.—*A. F. Sheppard; Rutland House, Kingston-on-Thames, May* 14, 1856.

Notodonta Carmelita at West Wickham.—It really seems that all our rarer insects are becoming common: in support of this remark I have only to refer to the capture of Ino Globulariæ, Notodonta cucullina and other Notodontidæ, Ptilophora plumigera, Dipthera Orion and Plusia orichalcea within the last year or so: to this list many might be added, and it is now my good fortune to announce the appearance this year in some numbers of the hitherto rare Notodonta Carmelita. I have heard of the capture of no less than fourteen specimens, seven of which, four males and three females, we have at the present time under braces. The seven in our possession were taken at West Wickham within the last fortnight. What would have been thought of this six years ago?—*Id.*

Error in the 'Entomologist's Weekly Intelligencer.'—At p. 26 of the 'Entomologist's Weekly Intelligencer,' and subsequently at p. 44, Ennomos sublunaria is referred to as the summer brood of E. illustraria. I beg to say that E. sublunaria, *Steph.*, is a dark variety of E. lunaria, as may be seen by reference to the figure on the 28th plate of the 'Illustrations;' the deeply dentate posterior wings will at once distinguish it from any variety of the male illustraria. The specimen from which this figure and description was taken, consequently the type specimen of sublunaria, is in my collection.—*Edwin Shepherd; May* 14, 1856.

Double-broodedness of Notodonta camelina.—I have carefully perused, analysed and digested Mr. E. Shepherd's article (Zool. 5072) on the double-broodedness of Notodonta camelina; but though Mr. Shepherd casts the gravest doubts on my proofs and assertions, and Mr. Newman seems to infer that the bare supposition of its being double-brooded is absurd, I am compelled, with all due deference to the entomological lore of those two veteran knights of the net, to remain unshaken in my former opinion, *viz.* that Notodonta camelina is most undoubtedly double-brooded. Mr. Shepherd says that, by "especial care," my eggs of camelina produced moths in August, and, interpreting "especial care" by the terms "abundant supply of food" and "want of exercise," he argues that had it not been for this "especial care" the moths would not have emerged till the following spring. Now the facts of the case are these: between the time of my finding the eggs (26th May) and their hatching, which took place in about a week, I did take "especial care" of them, in the hope that they might produce N. carmelita. A very few days after they hatched, however, I perceived my hope to be fallacious, and recognised them as indubitable camelina: after this period "especial care" at once vanished, and, so far from having an "abundant supply" of food, the larvæ were very often, I won't say starving, but on uncommonly short allowance. So that the treatment they experienced, so far from being calculated to accelerate maturity, was likely to retard it, and, in fact, corroborate Mr. Shepherd's own experience in the case of E. illunaria. With regard to the want of exercise, I cannot conceive that that has anything whatever to do with the question. The larvæ of all the Notodontidæ are extremely sluggish in their habits, and that of camelina not the least so, and nothing would astonish me more than to meet a larva of that moth taking its daily constitutional. My larvæ were kept in a cool room, where the windows were constantly open; they were irregularly fed, and no particular care taken of them; and yet they produced moths in August. This appears to me to prove incontestably that the insect is double-brooded, as there seems to be no reason whatever to doubt that precisely the same result would have occurred out of doors. The birch tree upon which I found the eggs was in full leaf, so that the larvæ would have had no ground of complaint as respects food, and there was nothing in the weather from June to August which would be likely to retard their arrival at maturity. Every entomologist, I believe, allows that Notodonta ziczac, N. dromedarius, N. dictæa and N. dictæoides are double-brooded, and that the eggs laid by the second brood in August produce larvæ which are full-grown in October and often November. Why should not the same result, most naturally, take place with camelina? I myself have frequently taken the larvæ of camelina in November, and have no doubt whatever in my own mind that they were the produce of moths bred in August from a spring brood of larvæ. I am as fully aware as Mr. Shepherd of the premature autumnal development of many of our moths when reared in confinement; but I have strong doubts as to the correctness of the term "premature," and am inclined to think that the same result occurs occasionally in the natural state. I may mention a curious instance, which confirms my suspicion, and also supports an assertion which I made in my article of the 7th of November, 1855 (Zool. 4952), that there was sometimes a very late autumnal brood of Clostera reclusa. When staying, a short time since, with Mr. C. R. Bree, of Stowmarket, I saw, in the collection of a neighbour of his, a specimen of C. reclusa, which was taken, some little time since, near Stowmarket, quite late in the autumn: the captor, a worthy farmer who collects for his own amusement, was very much puzzled when, upon referring to his books, he found that the insect only appeared in the spring and early part of the summer, and was delighted when I told him that I had bred it in the autumn. I am firmly convinced that much yet remains to be discovered with respect to the breeding of our Lepidoptera; and I cannot conclude this paper, which I have already extended to far greater length than I originally intended, without expressing an opinion that that tendency which seems to be rife among metropolitan entomologists to brand every new opinion propounded by a country entomologist as untenable and absurd, is calculated to do the greatest possible damage to the delightful and interesting science of Entomology.—*H. Harpur Crewe; Pyle Farm, Horndean, Hants, May* 13, 1856.

Do the Males of certain of our Lepidopterous Insects become possessed of an instinctive knowledge of the "whereabouts" of the Females even before the latter emerge from the Chrysalis state?—The following occurrence goes far to convince me that they do. On the 2nd ult. I observed a male specimen of Biston prodromarius resting on the trunk of an oak in Cokethorpe Wood, close to the ground. As I happened to be in want of a male specimen, I took this one without noticing its condition, having no doubt, from the very conspicuous situation it was occupying, that it was just "out," for after an insect has once flown it is generally artful enough to conceal itself pretty securely. However, I found on examination convincing proofs that this fellow had been some time on the wing. It soon after occurred to me that very possibly there might be "a lady *in the case*," and that the object this gentleman had in view in placing himself on that particular spot was that he might be "the first in the field,"—the first to woo the expected fair so soon as she should burst the bands which held her in thrall; for in love, in war, in chess and some other games the first "advance," if not "half the battle," is at least held to be an important step, and of infinite advantage to the party making it. I determined therefore to revisit the spot at proper intervals, if haply my suspicions might prove to be well founded. The result proved that they were; for before many hours had elapsed a fine female emerged, and was found reposing within a few inches of the identical spot from which the male had been removed. I have, moreover, repeatedly observed numbers of males of Hepialus lupulinus hovering about a particular spot, and have often searched in expectation of finding a female concealed among the herbage; I generally, however, failed in finding one; and I have now no doubt that these repeated failures arose, as failures generally do arise, from *not searching deep enough:* had I made deeper search, I am convinced that I should have found the chrysalis of a female lupulinus "about to change her condition," in more senses than one. Talk of love-making in one's cradle! Here we have a practical illustration of the art.—*S. Stone; May* 8, 1856.

Capture of Elaphrus lapponicus in Glen Almond, Perthshire.—On the 24th of April, 1856, while enjoying the hospitality of the Warden of Trinity College, Glen Almond, Perthshire, I accompanied that gentleman in a delightful ramble upon the hills to the North of the College, and very near to the slate quarries now being worked by Lord Mansfield I found five specimens of Elaphrus lapponicus, one being the variety splendidus, *Dej.* I observed Saxifraga Aizoides and Lycopodium Selaginoides, with other subalpine plants, growing in the wet, oozy ground, over which the insect was running. In a drier situation, but at a lower elevation, upon the same mountain, I observed Tarus basalis, *Steph.*—*W. H. Lowe; Balgreen, Edinburgh, May* 20, 1856.

Capture of Lebia crux-minor and Bembidium obliquum at Brighton.—Dr. Power has just shown me a beautiful specimen of Lebia crux-minor, being one of thirteen taken by Mr. Hemmings at Holm Bush during the present month; also a specimen of Bembidium obliquum, of which he took about a dozen under wet stones at Hove, on the 11th.—*Edward Newman.* Dr. Power has since visited the crux-minor station, and captured eight specimens with his own hand.—*E. N.*

Description of the Male of Callimome flavipes.—Having lately bred a male Callimome flavipes from an oak-gall, I beg to forward you the description of it:—

CALLIMOME FLAVIPES.

Description of the Male.—Brilliant green shot with gold. Head and thorax coarsely punctured, and transversely undulate-striate: these undulating lines, when viewed from the head, looking towards the abdomen, appear like minute imbricated scales, somewhat in the manner of the back of a Chiton (or coat of mail). Abdomen very minutely punctured, with the exception of the basal segment, which is impunctate; green at the extreme base, the rest brilliant purple and gold; the next two segments brilliant purple above and green beneath, the rest to the apex golden green, with the basal portions purple; the whole, except the basal segment, minutely undulate, transversely striate. Femora, anterior and posterior green; their base and apex pale yellow, the intermediate pair with a dusky green stain beneath, their tibiæ and tarsi pale yellow; the latter dusky at the apex. Wings beautifully iridescent; the nervures and stigma dark ferruginous; the base of the former pale yellow. Length 2 lines; expanse of wings 3 lines.

These males appear to be very scarce compared to the females; though I have bred a good many of the latter I have never bred a male before. I have also bred, from some of these galls, two specimens of what appears to be Cynips Quercus-folii; at least I cannot see any difference between these and some I had reared from galls on the oak leaves. The galls from which these two emerged are precisely like those from which C. Lignicola are bred, and were gathered with the intention of breeding some of them. This is a curious fact, and tends to involve the study of this genus in more confusion than ever, for if the species are not confined to the various parts of the oak, from which the Cynips have received their specific names, then the whole genus is thrown into almost inextricable confusion: this also tends to show that such names as Quercus-folii, Quercus-petioli, &c., should be used with very great caution, otherwise we shall be creating numbers of species without any *real* distinction.—*Edward Parfitt; 4, Weirfield Place, St. Leonard's, Exeter, May* 10, 1856.

PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY.

May 5, 1856.—W. W. SAUNDERS, Esq., President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be given to the donors:—'Insecta Britannica,' Diptera, Vol. iii.: by Francis Walker, F.L.S.; presented by the publisher, Lovell Reeve, Esq. The 'Natural History Review,' No. 9; by the Dublin University Zoological Association. 'Revue et Magasin de Zoologie,' 1856, Nos. 2 and 3; by the Editor, Monsieur F. E. Guérin-Méneville. Hewitson's 'Exotic Butterflies,' Part 18; by W. W. Saunders, Esq., F.R.S., &c. The 'Literary Gazette' for April; by the Editor. The 'Athenæum' for April; by the Editor. The 'Journal of the Society of Arts' for April; by the Society of Arts. The 'Zoologist' for May; by the Editor. The 'Entomologist's Weekly Intelligencer,' Nos. 2, 3, 4 and 5; by the Editor, H. T. Stainton, Esq. 'A Manual of British Butterflies and Moths,' No. 3; by the Author, H. T. Stainton, Esq. Four specimens of Acidalia degeneraria, and four specimens of Heliothis dipsacea; by O. Pickard-Cambridge, Esq.

Election of Members.

Edward Armitage, Esq., 4, Grove End Road, St. John's Wood, was balloted for, and elected a Member of the Society.

The President stated that the Entomological Society of France had elected Mr. John Curtis one of its Honorary Members; he felt that this recognition of the valuable entomological labours of our late President would be as gratifying to the Society as to Mr. Curtis himself.

Exhibitions.

Mr. Janson exhibited three specimens of a Histerideous beetle, hitherto unnoticed as British, Hetærius quadratus, *Kug.*, *Eric.*, which he had captured in the society of ants at Hampstead, a single individual, on the 21st of April, 1848, in a nest of Formica flava, since which period he had assiduously searched for it every year, but unsuccessfully: on the 4th inst., however, he again met with two examples beneath a stone in the company of Formica fusca: he remarked that this insect, which was of great rarity on the Continent, appeared to be truly Myrmecophilous, and he called th attention of the meeting to the great similarity of form which exists between it an the anomalous genus Thorictus, likewise ants'-nest insects, and of which four specie were in the box; this resemblance he observed appeared, however, to be rather one o analogy than of real affinity. Mr. Janson added that his mode of obtaining the ants'-nest insects was by placing large stones or bricks in the vicinity of the nests, an carefully examining their under surfaces from time to time.

Mr. S. Stevens exhibited a fine male specimen of Petasia nubeculosa recently take by Mr. Foxcroft in Perthshire, and a remarkably fine specimen of Aleucis pictari which he had lately taken on Dartford Heath; also Pentaplatarthrus Natalensis, mal and female, sent by Mr. R. W. Plant from Natal, and observed that these specimen were extremely interesting, from the fact that the sexes of the Paussidæ were not previously known; he also exhibited several pairs of a singular Brenthus, described by Mr Westwood in the fifth volume of the 'Transactions' of the Society, p. 206, under th name of Taphroderes distortus, and figured on the 22nd Plate of that volume, the lef mandible of the male being much larger than the right, and singularly distorted.

Captain Cox exhibited a very large specimen of Acherontia Atropos taken in th Hospital at Scutari; also some drawings of the larvæ of British Lepidoptera, beautifully executed by Mrs. Cox: he expressed his intention, on the series becomin more complete, of making arrangements for their publication.

Mr. Bond exhibited specimens of the case-bearing larva of Coleophora Wockeell found on Betonica officinalis, in a wood near Canterbury: only five British specimen of this species have hitherto been detected, all found by Mr. Weir near Pembury.

Mr. Stainton exhibited, on behalf of Mr. John Scott, a specimen of Elachist Tæniatella, (*Zeller*), a new British species bred from a larva found last autumn in th leaves of Brachypodium sylvaticum; he also exhibited a most beautifully execute engraving of Lithocolletis tenella, engraved on steel by Mr. Edward Robinson.

Mr. Newman communicated the following:—

Note on Hemerobius variegatus.

I am indebted to Mr. Dorville for the opportunity of offering to the notice of th Society a singular instance of deviation from normal economy in a very familiar genu of insects: he found the pupa shell of Abraxas Grossularia filled with a beautifull white silken cocoon, which he very logically supposed that of a parasite which ha destroyed the pupa; but lo! and behold! when the tenant, and indeed the artificer, o the delicate fabric burst its sere-clothes and emerged as an imago, it proved to be specimen of Hemerobius variegatus, an insect in which parasitic propensities are utterl unknown. The inference is that the larva of the Hemerobius simply availed itself o the cavernous recesses of the exuviæ of the currant-moth as a cosey corner in whic to spin its web and undergo its metamorphosis.

Mr. John Curtis communicated the following notes on the economy of Gonepteryx Rhamni, by Dr. Maclean, of Colchester, dated 1st May, 1856:—

11 JU 56

"On Friday last the bright sunshine tempted me to the woods in search of the egg of G. Rhamni, and not without success, you will say, when I tell you I have above score of eggs of this insect in my possession: it is my intention to acquire the mo

The Aquarium—Marine and Fresh-Water.

W. ALFORD LLOYD announces his removal from St. John-Street Road to the specially arranged and very commodious Premises as nder. His facilities are now largely increased, and his stock of LIVING MARINE NIMALS and SEA-WEEDS represents the varied produce of nearly the whole of ur shores. A detailed List may be had on application. Sea water, specific-gravity ests, and all the requisite apparatus. Sole agent for the celebrated tanks of Messrs. anders and Woolcott, as used by the Zoological Society of London.

19 and 20, Portland Road, Regent's Park, London.

GOOD SPECIMENS of the following INSECTS for Sale at JAMES GARDNER'S, 52, High Holborn, London:—

Daplidice, Hyale, Betulæ, C-album, Pruni, Dispar, Acis, Arion, Artaxerxes, athonia, Iris, Cassiope, Hero, Davus, Atropos, Nerii, Celerio, Lineata, Euphorbiæ, alii, Pinastri, Pulchella, Cribrum, Grammica, Quadra, Versicolor, Fagi, Cucullina, armelita, Dromedarius, Trepida, Crenata, Curtula, Anachoreta, Anastomosis, Auricoma, rion, Rubiginea, Lychnitis, Asteris, Absinthii, Orichalchea, Fraxini, Leporina, llustraria, Alniaria, and a host of others too numerous to mention; together with an ndless variety of Pocket Boxes, Setting Boards, and House-Fly Nets of every descrip-ion. Only maker of the Patent Umbrella Net for 7*s.* 6*d.*

J. G. has in a forward state a Cabinet of British Insects for the use of those gentle-nen who have favoured him with their support.

MR. CURTIS'S COLLECTIONS of FOREIGN COLEOPTERA, &c.—This choice collection, which was commenced thirty years since, is particu-arly rich in Species from New Holland, Java, the Philippine Islands, the Cape, Sene-al, Gambier, South America, including Cayenne, Chili, Lima, Columbia, also Mexico, orth America and the South of Europe. There are also many fine Species from Ma-agascar, Mauritius, Port Natal, Valparaiso, West Indies, New Grenada, Guatemala, ssam, East Indies, Ceylon, Algiers, Thibet, New Guinea, Siberia, &c.

The specimens are in the most perfect condition, are arranged, and have been amed by Dejean and other eminent Entomologists.

The following is the list of the Families for sale:—

		Species.	Specimens.	Price.		
				£	*s.*	*d.*
Cicindelidæ	about	160	330	12	0	0
Carabidæ	"	979	1920	72	0	0
Dyticidæ	"	120	228	4	5	6
Buprestidæ	"	308	743	28	0	0
Elateridæ	"	313	458	8	10	0
Malacodermes	"	278	581	7	10	0
Tillidæ	"	125	216	4	0	0
Silphidæ	"	65	142	1	7	0
Clavicornes	"	265	557	5	0	0
Helophoridæ and Hydrophilidæ	"	80	107	0	13	6
Lamellicornes	"	1117	2530	95	0	0
Lucanidæ	"	42	100	7	10	0
Passalus	"	32	79	1	10	0
Heteromera	"	985	1994	25	0	0
Xylophagi-Paussi	"	180	290	5	10	0
Longicornes	"	754	1386	52	0	0
Mantidæ and Phasmidæ	"	43	82	8	0	0
Forficulidæ and Blattidæ	"	44	89	1	0	0
Locustidæ and Gryllidæ	"	105	216	5	10	0
Hemiptera	"	639	1175	10	0	0
Aptera and Myriopoda	"	68	102	2	0	0

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